



SEVEN STAR LEMON TECHNOLOGY CO., LTD.

XUYAO ROAD,ECONOMIC DEVELOPMENT ZONE,YISHUI COUNTY,

LINYI CITY,SHANDONG PROVINCE,CHINA

TEL:+86-0536-6619777

FAX:+86-0536-6620777

Certificate of Analysis

Product Name: Citric Acid Monohydrate

Molecular Formula: $C_6H_8O_7 \cdot H_2O$

CAS.: 5949-29-1

Packing: In 25kg Bag

Quantity: 200T

PO NO.: 129/CEL/03/2025

Report No.: QXNM-2025-050825

Batch No.: M02504003

Mesh No: 8-40mesh

Production Date: APR.02.2025

Expiry Date: APR.01.2028

Item	Unit	Quality Standards	Analysis Results
Characters	---	White or almost white, crystalline powder, colourless crystals or granules. Odorless, has a strongly acid taste. effloresces in dry air. Very soluble in water, freely soluble in ethanol.	Pass
Identification	---	Pass Test	Pass
Appearance of solution	---	Pass Test	Pass
Assay	%	99.5~ 100.5	99.9
Water	%	7.5~ 8.8	8.64
Readily Carbonisable Substances	---	Pass Test	Pass
Sulphated Ash (Residue on Ignition)	%	≤ 0.05	0.02
Sulfate	mg/kg	≤ 150	<150
Oxalate	mg/kg	≤ 100	<100
Lead	mg/kg	≤ 0.5	<0.05
Arsenic	mg/kg	≤ 1.0	<0.3
Mercury	mg/kg	≤ 1.0	<0.5
Aluminium	mg/kg	≤ 0.2	<0.2
Heavy Metals	mg/kg	≤ 5.0	<5.0
Bacterial endotoxins	IU/mg	≤ 0.5	<0.5
Conclusion: The product is in conformity with BP/USP/FCC/E330			

Signature&Stamp:



Analysis Date: APR.02.2025

ALLERGENS FREE STATEMENT/OŚWIADCZENIE ALERGENY

**Product name/
Nazwa produktu:** CITRIC ACID MONOHYDRATE

**Manufacturer/
Producent** SEVEN STAR LEMON TECHNOLOGY CO., LTD.

The raw material shall be free from allergens that are not listed on ingredients list and free from allergen carry over (Carry over – traces of product from the previous run, which cannot be adequately cleaned from the product line due to technical limitations and traces of product or raw materials, which may, through current practices come into contact with products, produces on a separate line or in a separate processing area)./ Surowiec musi być wolny od alergenów, które nie są wymienione na liście składników i wolny od alergenów przenoszenia (Przeniesienie – ślady produktów z poprzedniego biegu, które nie mogą być odpowiednio oczyszczone z linii produktów ze względu na ograniczenia techniczne i ślady produktu lub surowca, które mogą za pośrednictwem obecnych praktyk mieć kontakt z produktami, wytwarza się w osobnej linii lub w oddzielnym obszarze przetwórstwa).

ALLERGENS /ALERGENY	Contain/ Zawiera	Cross contamination possibility/ Możliwość zakażenia krzyżowego
Cereals containing gluten (i.e. wheat, rye, barley, oats, spelt, kumat or their hybridized strains) and products thereof/Zboża zawierające gluten (tj. pszenica, żyto, jęczmień, owies, orkisz, kumat lub ich zhybrydizowane szczepy)i produkty pochodne	NO/NIE	✓ NO/NIE
Crustaceans and products thereof/Skorupiaki i produkty pochodne	NO/NIE	✓ NO/NIE
Eggs and products thereof/Jaja i produkty pochodne	NO/NIE	✓ NO/NIE
Fish and products thereof/Ryba i produkty pochodne	NO/NIE	✓ NO/NIE
Peanuts and products thereof/Orzeszki ziemne i produkty pochodne	NO/NIE	✓ NO/NIE
Milk and products thereof (including lactose)/Mleko i produkty pochodne (w tym laktoza)	NO/NIE	✓ NO/NIE
Nuts i.e. Almond (Amygdalus communis L.), Hazelnut (Corylus avellana), Walnut (Juglans regia), Cashew (Anacardium occidentale), Pecan nut (Carya illinoiesie Wangenh K. Koch), Brazil nut (Bertholletia excelsa), Pistachio nut (Pistaxis vera), Macadamia nut and Queensland nut (Macadamia ternifolia) and products thereof/Orzechy tj. migdały, orzechy laskowe, orzechy włoskie, orzechy nerkowca, orzechy pacan, orzechy brazylijskie, orzechy pistacjowe, orzechy makadamia i produkty pochodne	NO/NIE	✓ NO/NIE
Celery and products thereof/Selery i produkty pochodne	NO/NIE	✓ NO/NIE
Mustard and products thereof/Gorczyca i produkty pochodne	NO/NIE	✓ NO/NIE
Sesame seeds and products thereof/Ziarna sezamu i produkty pochodne	NO/NIE	✓ NO/NIE
Sulphur dioxide and sulphites at concentrations of more than 10 mg/kg or 10 mg/litre expessed as SO2/Dwutlenek siarki i siarczyny w koncentracji większej niż 10 mg/kg lub 10 mg/l	NO/NIE	✓ NO/NIE
Lupin and products thereof/ Łubin i produkty pochodne	NO/NIE	✓ NO/NIE
Molluscs and products thereof/Mięczaki i produkty pochodne	NO/NIE	✓ NO/NIE
Soybeans and products thereof/Ziarna soi i produkty pochodne	NO/NIE	✓ NO/NIE

SEVEN STAR LEMON TECHNOLOGY CO., LTD.
七星柠檬科技有限公司

02-12-2024

Date/data:

(company stamp, sign/ pieczętka i podpis)

VERIFICATION OF COMPLIANCE

Applicant: Seven Star Lemon Technology Co., Ltd.
The south of South Second Ring Road and the west of Xuyao Road,
Lushan Project Area, Economic Development Zone, Yishui County,
Linyi City, Shandong Province, P.R. China

Audit Scope: Production of citric acid and sodium citrate

The business operator has been audited and found to be in conformity with:

GMP CODEX ALIMENTARIUS GENERAL PRINCIPLES OF FOOD HYGIENE CAC/RCP-1-1969, REV.
4(2003)

This verification of Compliance has been granted to the applicant based on the results of the audit, performed by SGS-CSTC Standards Technical Services Co., Ltd. on the above-mentioned scope in accordance with the provisions of the relevant specific Directives

This certificate is valid from 11 August 2023 to 10 August 2026

Remains valid subject to satisfactory surveillance audits

Recertification audit due before 22 July 2026

Issue:2 Certified since 11 August 2020

Authorized by

Jian Wang

Jian Wang
Director -Health & Nutrition

SGS-CSTC Standards Technical Services Co., Ltd.
16F Century Yuhui Mansion, No.73 Fucheng Road, Beijing, P.R. CHINA 100142
t +86(0)10 58251188 www.sgsgroup.com.cn





بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
مَجْلِسُ الْعُلَمَاءِ (الدُّعْوَى)

F0051522

MAJELIS ULAMA INDONESIA
THE INDOONESIAN COUNCIL OF ULAMA

KETETAPAN HALAL
اثبات الحلال
HALAL DECREE

No : LPPOM-00310104310620 : الرقم

إن مجلس العلماء الاندونيسي - بعد الاختبارات والبحوث - بالإعتماد علي فحص المحتويات والإجراءات من
Majelis Ulama Indonesia (MUI), after reviewing, and deliberating the audit result conducted by:

THE ASSESSMENT INSTITUTE FOR FOODS, DRUGS AND COSMETICS OF MUI
(LPPOM MUI)

قرر بان المنتجات الغذائية أو الأدوية أو مستحضرات التجميل المبين اسمها أدناه حلال حسب متطلبات الشريعة الإسلامية
مادامت تركيبات المواد المشر إليها وعملية إنتاجها ونظام ضمان الحلال (HAS 23000) مطابقة علي الشكل الذي قرره قسم
الإفتاء بالمجلس

declares that the product(s) stated below HALAL according to the Islamic Law as long as the ingredients,
production process, and the implementation of Halal Assurance System (HAS 23000) are in accordance to the
decree of Fatwa Commission of the Indonesian Council of Ulama.

Name of Company : SEVEN STAR LEMON TECHNOLOGY CO.,LTD.

اسم الشركة :

Product Group : ADDITIVES (BAHAN TAMBAHAN)

عنوان الشركة :

قائمة المنتجات الحلال و منشأة الإنتاج مرفقة في مرسوم رسالة إثبات الحلال

The list of products and facilities can be seen in the attachment of the Halal Decree

Issued in Jakarta on : JUNE 15th, 2022

اصدرت هذه الشهادة بجاكرتا في :

Valid until : JUNE 14th, 2026

وصالحة إلى :

رئيس قسم الإفتاء بالمجلس
CHAIRPERSON OF MUI FATWA
DIVISION

Dr. H.M. ASRORUN NI'AM
SHOLEH, M.A.

نائب الرئيس العام للمجلس
VICE CHAIRMAN OF MUI

Dr. K.H. MARSUDI SYUHUD, M.B.A.

مديرة لجنة البحوث في الأطعمة و الأدوية

ومستحضرات التجميل بالمجلس

THE ASSESSMENT INSTITUTE

FOR FOODS, DRUGS AND COSMETICS OF MUI
(LPPOM MUI)

PRESIDENT DIRECTOR

Ir. Hj. MUTI ARINTAWATI, M.Si.

SCAN FOR VIEW LIST OF CERTIFIED PRODUCT





No : LPPOM-00310104310620

Nama Perusahaan : SEVEN STAR LEMON TECHNOLOGY CO.,LTD.
THE SOUTH OF SOUTH SECOND RING ROAD AND
THE WEST OF XUYAO ROAD,LUSHAN PROJECT
Alamat Perusahaan : AREA,ECONOMIC DEVELOPMENT ZONE,YISHUI
COUNTY,LINYI CITY,SHANDONG
PROVINCE,SHANDONG,P.R. CHINA
Nama Fasilitas : SEVEN STAR LEMON TECHNOLOGY CO.,LTD.
THE SOUTH OF SOUTH SECOND RING ROAD AND
THE WEST OF XUYAO ROAD,LUSHAN PROJECT
Alamat Fasilitas : AREA,ECONOMIC DEVELOPMENT ZONE,YISHUI
COUNTY,LINYI CITY,SHANDONG
PROVINCE,SHANDONG,P.R. CHINA
Jenis Produk : BAHAN KIMIAWI LAINNYA (OTHER CHEMICALS)
Nama Produk :

No	Nama Produk	Tipe Produk
1	Citric Acid Monohydrate	Acid and Acidulant (Asam dan Asidulan)
2	Citric Acid Anhydrous	Acid and Acidulant (Asam dan Asidulan)
3	Trisodium Citrate dihydrate	Acid and Acidulant (Asam dan Asidulan)

Dikeluarkan di Jakarta pada : JUNE 15TH, 2022
Berlaku sampai dengan : JUNE 14TH, 2026

Ketua MUI Bidang Fatwa

Dr. H.M. ASRORUN NI'AM SHOLEH, M.A.

Lembaga Pemeriksa Halal
LPPOM MUI

Ir. Hj. MUTI ARINTAWATI, M.Si.

Certificate CN20/10372

SGS

The management system of

Seven Star Lemon Technology Co., Ltd.

The south of South Second Ring Road and the west of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong Province, P. R. China

has been assessed and certified as meeting the requirements of

SGS NON - GMO

IP Supply Chain Standard, Version 5.0, April 2020

For the following activities

- Raw material receiving: Corn (PCR Testing)
- Processing: Ingredient Producer: The production of 'Identity Preserved (IP)': Citric acid and Sodium Citrate
- Products Delivery

This certificate is valid from 13 April 2023 until 07 April 2026 and remains valid subject to satisfactory surveillance audits.

Issue 3. Certified since 07 April 2020



Authorised by
Michiel Kaizer
Certification Manager SGS Product
& Process Certification

SGS Nederland B.V.
Knowledge Solutions, Malledijk 18, PO Box 200, 3200 AE Spijkenisse, The Netherlands
t +31(0)88 – 2143333 - www.sgs.com

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China Quality Mark

Quality Management System Certificate

Certificate Number:00223Q21754R1M

CQM hereby certifies that

Seven Star Lemon Technology Co., Ltd.

Unified Social Credit Identifier: 91371323MA3MLW872N

Domicile:South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

Certification Add.:South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

the management system conform to

GB/T 19001-2016/ISO 9001:2015

This certificate is valid to the following scope:

Production of citric acid and trisodium citrate dihydrate

China Quality Mark

(The information of this certificate can be inquired on www.cnca.gov.cn or website of CQM. The continual validity of the certificate can be checked by Certificate Confirmation of surveillance.)

Issued on: 2023-04-11

Expires on: 2026-04-22

签发人: _____



中国认可
国际互认
管理体系
MANAGEMENT SYSTEM
CNAS C002-M



Member of



方圆标志认证集团

China Quality Mark Certification Group

CHINA
QUALITY MARK

北京市海港区曙光路33号 电话: 010-88411888 网站: <http://www.cqm.com.cn>
Address: No.33, Zengguang Road, Haidian District, Beijing, P.R. China



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Certificate

CQM has issued an IQNET recognized certificate that the organization:

Seven Star Lemon Technology Co., Ltd.

Certification Add.: South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

for the following scope:

Production of citric acid and trisodium citrate dihydrate

has implemented and maintains a

Quality Management System

which fulfils the requirements of the following standard:

ISO 9001:2015

Issued on: 2023-04-11

Expires on: 2026-04-22

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: CN-00223Q21754R1M

Alex Stoichitoiu
President of IQNET

Ji XiaoDong
President of CQM



This attestation is directly linked to the IQNET Member's original certificate and shall not be used as a stand-alone document

IQNET Members*:

AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CISO Italy CQC China CQM China CQS Czech Republic
Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA FCAV Brazil FONDONORMA Venezuela ICONTEC
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LSQA Uruguay MIRTEC Greece MSZT Hungary Nemko AS Norway NSAI Ireland NYCE-SIGE Mexico PCBC Poland Quality Austria
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China Quality Mark

Environmental Management System Certificate

Certificate Number:00223E31150R1M

CQM hereby certifies that

Seven Star Lemon Technology Co., Ltd.

Unified Social Credit Identifier: 91371323MA3MLW872N

Domicile:South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

Certification Add.:South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

the management system conform to
GB/T 24001-2016/ISO 14001:2015

This certificate is valid to the following scope:

Production of citric acid and trisodium citrate dihydrate

China Quality Mark

(The information of this certificate can be inquired on www.cnca.gov.cn or website of CQM. The continual validity of the certificate can be checked by Certificate Confirmation of surveillance.)

Issued on: 2023-04-11

Expires on: 2026-10-10

签发人: _____



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国际互认
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MANAGEMENT SYSTEM
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Member of



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China Quality Mark Certification Group

CHINA
QUALITY MARK

北京市海淀区增光路33号 010-88411886 <http://www.cqm.com.cn>
Address: No.33, Zengguang Road, Haidian District, Beijing, P.R. China





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Seven Star Lemon Technology Co., Ltd.

Certification Add.: South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

for the following scope:

Production of citric acid and trisodium citrate dihydrate

has implemented and maintains a

Environmental Management System

which fulfils the requirements of the following standard:

ISO 14001:2015

Issued on: 2023-04-11

Expires on: 2026-10-10

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: CN-00223E31150R1M

Alex Stoichitoiu
President of IQNET

Ji XiaoDong
President of CQM



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China Quality Mark

Occupational Health and Safety Management System Certificate

Certificate Number: CQM23S21067R1M

CQM hereby certifies that

Seven Star Lemon Technology Co., Ltd.

Unified Social Credit Identifier: 91371323MA3MLW872N

Domicile: South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

Certification Add.: South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China
the management system conform to

GB/T 45001-2020/ISO 45001:2018

This certificate is valid to the following scope:

Production of citric acid and trisodium citrate dihydrate

China Quality Mark

(The information of this certificate can be inquired on www.cnca.gov.cn or website of CQM. The continual validity of the certificate shall be checked by Certificate Confirmation of surveillance.)

Issued on: 2023-04-11

Expires on: 2026-04-22

签发人: _____



Member of



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北京市海淀区增光路33号 电话: 010-88411898 网站: <http://www.cqm.com.cn>
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Certificate

CQM has issued an IQNET recognized certificate that the organization:

Seven Star Lemon Technology Co., Ltd.

Certification Add.: South of South Second Ring Road, West of Xuyao Road, Lushan Project Area, Economic Development Zone, Yishui County, Linyi City, Shandong, P.R.China

for the following scope:

Production of citric acid and trisodium citrate dihydrate

has implemented and maintains a

Occupational Health and Safety Management System

which fulfils the requirements of the following standard:

ISO 45001:2018

Issued on: 2023-04-11

Expires on: 2026-04-22

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: CN-CQM23S21067R1M

Alex Stoichitoiu
President of IQNET

Ji XiaoDong
President of CQM



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Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA FCAV Brazil FONDONORMA Venezuela ICONTEC
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LSQA Uruguay MIRTEC Greece MSZT Hungary Nemko AS Norway NSAI Ireland NYCE-SIGE México PCBC Poland Quality Austria
Austria SII Israel SIQ Slovenia SIRIM QAS International Malaysia SQS Switzerland SRAC Romania TSE Türkiye YUQS Serbia

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Safety data sheet*according to 1907/2006/EC, Article 31*

Printing date 01.11.2023

Version number 1

Revision: 01.11.2023

SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1 Product identifier**

Trade name: Citric Acid Monohydrate
Chemical Identification: CAS number: 5949-29-1
EC number:
201-069-1
Index number:
607-750-00-3
REACH registration number:
01-2119457026-42-0012
Nano form: no.

1.2 Relevant identified uses of the substance or mixture and uses advised against**Application of the substance / the preparation:**

Formulation
Intermediate
Cleaning products
Personal care products
Paper industry
Cement retardation products
Polymers and plastics
Scale inhibition in oilfield water systems
Textile industry
Coatings and paints
Photographic processing
Anti-scalant, complexing agent in water treatment systems
Treatment of metal surfaces
Cleaning of metal surfaces
Agricultural applications
Laboratory reagent

1.3 Details of the supplier of the safety data sheet**Manufacturer/Supplier:**

Seven Star Lemon Technology Co., Ltd.
Lushan Industrial zone, Linyi, Yishui, Shangdong, China
Tel: 0086 539 5972606
Fax: 0086 539 5972606

Further information obtainable from:

Only Representative
B-Lands Consulting
5 Place Robert Schuman, BP 1516
38025 Grenoble, FRANCE
Tel: +33 476 295 869
Fax: +33 476 295 870
Email: clients@reachteam.eu
www.reachteam.eu

1.4 Emergency telephone number(s):

Ireland - National Poisons Information Centre: 01 837 9964 or 01 809 2566 (healthcare professionals only).
NHS Direct: 111
National Poisons Information Service (NPIS): 0121 507 4123 (healthcare professionals only).

SECTION 2: Hazards identification**2.1 Classification of the substance or mixture****Classification according to Regulation (EC) No 1272/2008**

Eye Irrit. 2 H319 Causes serious eye irritation.
STOT SE 3 H335 May cause respiratory irritation.

Safety data sheet

according to 1907/2006/EC, Article 31

Printing date 01.11.2023

Version number 1

Revision: 01.11.2023

Trade name: Citric Acid Monohydrate

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008:

The substance is classified and labelled according to the CLP regulation.

Hazard pictograms:

GHS07

Signal word: Warning**Hazard statements:**

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

Precautionary statements:

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P264 Wash hands thoroughly after handling.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P312 Call a POISON CENTER/doctor if you feel unwell.

P337+P313 If eye irritation persists: Get medical advice/attention.

2.3 Other hazards

Results of PBT and vPvB assessment**PBT:** No PBT.**vPvB:** No vPvB.**Determination of endocrine-disrupting properties**

The product does not contain substances with endocrine disrupting properties.

SECTION 3: Composition/information on ingredients

3.1 Substances

CAS Number. Description.

5949-29-1 Citric Acid Monohydrate

EC number: 201-069-1**Index number:** 607-750-00-3**Additional information:** Purity: $\geq 99.5\%$ **Specific Concentration Limit:** Not available.**Nanoform No.**

SECTION 4: First aid measures

4.1 Description of first aid measures

After inhalation: Move patient to fresh air, if symptoms persist consult a doctor.**After skin contact:**

Immediately rinse with water.

If skin irritation continues, consult a doctor.

After eye contact:

Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

After swallowing:

Rinse out mouth and then drink plenty of water.

Do not induce vomiting.

Safety data sheet

according to 1907/2006/EC, Article 31

Printing date 01.11.2023

Version number 1

Revision: 01.11.2023

Trade name: Citric Acid Monohydrate

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Severe eye irritation. Cough.

Risks : Causes serious eye irritation. May cause respiratory irritation.

4.3 Indication of any immediate medical attention and special treatment needed

No further relevant information available.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:CO₂, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.**For safety reasons unsuitable extinguishing agents:** Water with full jet.

5.2 Special hazards arising from the substance or mixture

Carbon dioxide (CO₂)

Carbon monoxide (CO)

5.3 Advice for firefighters

Protective equipment:

Wear fully protective suit.

Wear self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation.

Ensure adequate ventilation.

Use personal protective equipment. Keep unprotected persons away.

Avoid inhaling dust and fumes.

Avoid contact with skin and eyes.

6.2 Environmental precautions

 No special measures required.

6.3 Methods and material for containment and cleaning up

Non-sparking tools should be used.

Retrieve the product by mechanical means.

Send for recovery or disposal in suitable receptacles.

6.4 Reference to other sections

See Section 7 for information on safe handling.

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Keep away from sources of ignition.

Prevent formation of dust.

Do not inhale dust / smoke / mist.

Avoid contact with the eyes and skin.

Information about fire - and explosion protection: No special measures required.

7.2 Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:

Store in a dry, cool and well-ventilated area.

Keep container tightly closed.

Provide acid-resistant floor.

Information about storage in one common storage facility:

Store away from strong bases and oxidizing agents.

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Trade name: Citric Acid Monohydrate**7.3 Specific end use(s):** No further relevant information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Ingredients with limit values that require monitoring at the workplace: Not required.

PNECs

77-92-9 Citric Acid

PNEC	0.44 mg/L (Water (Freshwater)) 0.044 mg/L (Water (Marine Water)) >1,000 mg/L (Sewage Treatment Plant (STP))
PNEC	3.46 mg/kg sedim. dw (Sediment (Marine Water)) 34.6 mg/kg sedim. dw (Sediment (Freshwater))
PNEC	33.1 mg/kg soil dw (Soil)

Additional information: The lists valid during the making were used as basis.

8.2 Exposure controls

Individual protection measures, such as personal protective equipment

General protective and hygienic measures:

Wash hands before breaks and at the end of work.
Do not eat, drink, smoke or sniff while working.
Immediately remove all soiled and contaminated clothing
Avoid contact with the eyes and skin.

Respiratory protection:

Use a suitable respiratory protective device in case of insufficient ventilation.
Suitable respiratory protective device recommended:
Filter P2

Hand protection



Protective gloves.

Eye/face protection



Safety goggles (EN 166).

Have an eye wash station available.

Body protection: Protective work clothing.

Environmental exposure controls

Avoid the release of the product into the environment. Comply with local and national law.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Physical state

Solid.

Colour:

White.

Odour:

Odourless.

Odour threshold:

Not determined.

Melting point/freezing point:

153 °C

Boiling point or initial boiling point and boiling range

Decomposes before boiling.

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Trade name: Citric Acid Monohydrate

Flammability	Product is not flammable.
Lower and upper explosion limit	
Lower:	Not determined.
Upper:	Not determined.
Flash point:	Not applicable.
Ignition temperature:	Not applicable.
Decomposition temperature:	>175 °C
pH	Not determined.
Viscosity:	
Kinematic viscosity	Not applicable.
VOC (EC):	
Dynamic:	Not applicable.
Solubility	
Water at 20 °C:	592 g/l
Partition coefficient n-octanol/water (log value)	-1.6 to -1.8
Vapour pressure at 25 °C:	2.2E-6 Pa
Density and/or relative density	
Relative density at 20 °C	1.665
Vapour density	Not applicable.
Particle characteristics	8-40 mash, 30-100 mesh
9.2 Other information	
Appearance:	
Form:	Crystalline
Explosive properties:	Product does not present an explosion hazard.
Softening point/range	
Oxidising properties	Not oxidising.
Evaporation rate	Not applicable.
Information with regard to physical hazard classes	
Explosives	Not applicable.
Flammable gases	Not applicable.
Aerosols	Not applicable.
Oxidising gases	Not applicable.
Gases under pressure	Not applicable.
Flammable liquids	Not applicable.
Flammable solids	Not applicable.
Self-reactive substances and mixtures	Not applicable.
Pyrophoric liquids	Not applicable.
Pyrophoric solids	Not applicable.
Self-heating substances and mixtures	Not applicable.
Substances and mixtures, which emit flammable gases in contact with water	Not applicable.
Oxidising liquids	Not applicable.
Oxidising solids	Not applicable.
Organic peroxides	Not applicable.
Corrosive to metals	Not applicable.
Desensitised explosives	Not applicable.

SECTION 10: Stability and reactivity

10.1 Reactivity No further relevant information available.

10.2 Chemical stability Stable under normal circumstances.

10.3 Possibility of hazardous reactions No dangerous reactions known.

10.4 Conditions to avoid Avoid all sources of ignition: heat, sparks, open flames.

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Trade name: Citric Acid Monohydrate**10.5 Incompatible materials**

Strong bases
Oxidizing agents

10.6 Hazardous decomposition products

Carbon dioxide
Carbon monoxide

SECTION 11: Toxicological information**11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute toxicity** Based on available data, the classification criteria are not met.**LD/LC50 values:****77-92-9 Citric Acid**

Oral	LD50	5,400 mg/Kg bw (Mouse) (OECD 401)
Dermal	LD50	>2,000 mg/Kg bw (Rat) (OECD 402)

Skin corrosion/irritation: Based on available data, the classification criteria are not met.**Serious eye damage/irritation:** Causes serious eye irritation.**Respiratory or skin sensitisation:** Based on available data, the classification criteria are not met.**Germ cell mutagenicity:** Based on available data, the classification criteria are not met.**Carcinogenicity:** Based on available data, the classification criteria are not met.**Reproductive toxicity:** Based on available data, the classification criteria are not met.**STOT-single exposure:** May cause respiratory irritation.**STOT-repeated exposure:** Based on available data, the classification criteria are not met.**Aspiration hazard:** Based on available data, the classification criteria are not met.**11.2 Information on other hazards****11.2.1 Endocrine disrupting properties** Substance is not listed.**SECTION 12: Ecological information****12.1 Toxicity****Aquatic toxicity:****77-92-9 Citric Acid**

LC50/48h	440 mg/L (Fish) (OECD 203)
NOEC	425 mg/L (Algae)
LC50/24h	1,535 mg/L (Daphnia Magna)

12.2 Persistence and degradability Readily biodegradable**12.3 Bioaccumulative potential** Does not accumulate in organisms.**12.4 Mobility in soil** pKa: 3.13, 4.76 and 6.4 at 25°C**12.5 Results of PBT and vPvB assessment****PBT:** No PBT.**vPvB:** No vPvB.**12.6 Endocrine disrupting properties**

The product does not contain substances with endocrine disrupting properties.

12.7 Other adverse effects No further relevant information available.**SECTION 13: Disposal considerations****13.1 Waste treatment methods****Recommendation:** Disposal must be made in accordance with official regulations.

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Trade name: Citric Acid Monohydrate**Uncleaned packaging:****Recommendation:**

Packaging that may not be cleansed must be disposed of in the same manner as the product.

SECTION 14: Transport information**14.1 UN number or ID number**

ADR, ADN, IMDG, IATA

Not applicable.

14.2 UN proper shipping name

ADR, ADN, IMDG, IATA

Not applicable.

14.3 Transport hazard class(es)

ADR, ADN, IMDG, IATA

Class

Not applicable.

14.4 Packing group

ADR, IMDG, IATA

Not applicable.

14.5 Environmental hazards

Marine pollutant:

No

14.6 Special precautions for user

Not applicable.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

No further relevant information available.

DIRECTIVE 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment – Annex II

Substance is not listed.

REGULATION (EU) 2019/1148**Annex I - RESTRICTED EXPLOSIVES PRECURSORS (Upper limit value for the purpose of licensing under Article 5(3))**

Substance is not listed.

Annex II - REPORTABLE EXPLOSIVES PRECURSORS Substance is not listed.**Regulation (EC) No 273/2004 on drug precursors** Substance is not listed.**Regulation (EC) No 111/2005 laying down rules for the monitoring of trade between the Community and third countries in drug precursors**

Substance is not listed.

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Abbreviations and acronyms:

WEL: Workplace Exposure Limits

ADR: Accord relatif au transport international des marchandises dangereuses par route (European Agreement Concerning the International Carriage of Dangerous Goods by Road)

IMDG: International Maritime Code for Dangerous Goods

IATA: International Air Transport Association

GHS: Globally Harmonised System of Classification and Labelling of Chemicals

EINECS: European Inventory of Existing Commercial Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

PNEC: Predicted No-Effect Concentration (REACH)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

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Trade name: Citric Acid Monohydrate

Eye Irrit. 2: Serious eye damage/eye irritation – Category 2

STOT SE 3: Specific target organ toxicity (single exposure) – Category 3

Annex: Exposure Scenarios

9.1 Exposure scenario 2: Formulation or re-packing - Formulation of citric acid into preparations

Market sector: Generic formulation of citric acid into preparations

Product category formulated: PC 1: Adhesives, Sealants; PC 3: Air care products; PC 9a: Coatings and Paints, Thinners, paint removers; PC 12: Fertilizers; PC 30: Photo-chemicals; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 39: Cosmetics, personal care products

EXPOSURE SCENARIOS - CITRIC ACID

Environment contributing scenario(s):		
CS 1	Formulation of citric acid into preparations	ERC 2
CS 2	Formulation into solid matrix	ERC 3
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 6	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 7	Mixing or blending in batch processes; Liquid	PROC 5
CS 8	Industrial spraying; Liquid	PROC 7
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 12	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 13	Laboratory chemicals; Liquid	PROC 15
CS 14	Manual activities involving hand contact; Liquid	PROC 19
CS 15	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 16	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 17	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 18	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 19	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 20	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a

EXPOSURE SCENARIOS - CITRIC ACID

CS 21	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 22	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness	PROC 9
CS 23	Laboratory chemicals; Solid, medium dustiness	PROC 15
CS 24	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

Citric acid is formulated into a wide range of products, often at specialist formulation sites. The processes and exposures are expected to be broadly similar across different industries. Formulation is generally carried out in batch processes, which may be open or closed; several steps may be involved.

9.1.1 Env CS 1: Formulation of citric acid into preparations (ERC 2)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.2 Env CS 2: Formulation into solid matrix (ERC 3)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)

9.1.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.1.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.5 Worker CS 5: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.1.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.6 Worker CS 6: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.1.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.7 Worker CS 7: Mixing or blending in batch processes; Liquid (PROC 5)**9.1.7.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.8 Worker CS 8: Industrial spraying; Liquid (PROC 7)

9.1.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.1.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.1.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.11 Worker CS 11: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.1.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.12 Worker CS 12: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.1.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.1.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.13 Worker CS 13: Laboratory chemicals; Liquid (PROC 15)

9.1.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.1.13.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.14 Worker CS 14: Manual activities involving hand contact; Liquid (PROC 19)

9.1.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm ²)	

9.1.14.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.15 Worker CS 15: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.1.15.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.16 Worker CS 16: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.1.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.17 Worker CS 17: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.1.17.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required for qualitative assessment due to STOT SE 3 inhalation hazard.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.17.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.18 Worker CS 18: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.1.18.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>(Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.18.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.19 Worker CS 19: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.1.19.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.19.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.20 Worker CS 20: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.1.20.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.20.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.21 Worker CS 21: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.1.21.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required for qualitative assessment due to STOT SE 3 inhalation hazard.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.21.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.22 Worker CS 22: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness (PROC 9)

9.1.22.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.22.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.9 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.23 Worker CS 23: Laboratory chemicals; Solid, medium dustiness (PROC 15)**9.1.23.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.1.23.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.10 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.24 Worker CS 24: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.1.24.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm ²)	

9.1.24.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.11 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2 Exposure scenario 3: Use at industrial sites - Use of citric acid as a chemical intermediate

Market sector: Use of citric acid as a chemical intermediate

Product category used: PC 0: Other

Sector of use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals

Environment contributing scenario(s):		
CS 1	Use of citric acid as a chemical intermediate	ERC 6a
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid may be used as an intermediate in the formation of:

- Metal-salts, such as magnesium citrate, iron citrate or zinc citrate.
- Others salts, for example ammonium citrate.
- Esters such as triethyl citrate or tributyl citrate.

In a typical process for the production of citrate salts, citric acid is dissolved in deionised water.

Addition of a source of the other ion results in conversion of citric acid to its salt. The salt is separated by evaporation and centrifugation, then dried, sieved and bagged.

The reactions may take place in a closed batch or continuous process with occasional opportunities for exposure arising, for example, during sampling.

9.2.1 Env CS 1: Use of citric acid as a chemical intermediate (ERC 6a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.2.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.2.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Closed process with no likelihood of exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.2.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.3 Worker CS 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.2.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required for qualitative assessment due to STOT SE 3 inhalation hazard.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.2.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.4 Worker CS 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.2.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required for qualitative assessment due to STOT SE 3 inhalation hazard.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.2.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.2.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.2.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.2.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required for qualitative assessment due to STOT SE 3 inhalation hazard.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.2.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.3 Exposure scenario 4: Use at industrial sites - Industrial use of citric acid in detergent and cleaning products

Market sector: Use of citric acid in detergent and cleaning products

Product category used: PC 3: Air care products; PC 28: Perfumes, Fragrances; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 8	Roller application or brushing; Liquid	PROC 10
CS 9	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 10	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness	PROC 2
CS 11	Chemical production where opportunity for exposure arises; Solid, low dustiness	PROC 4
CS 12	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness	PROC 8a
CS 13	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness	PROC 8b
CS 14	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness	PROC 9

Further description of the use:

Citric acid and its salts are used in a wide variety of cleaning and maintenance products for industrial and professional uses.

The main use or function of citric acid and its salts in detergents and cleaning products is as a complexing agent/ sequestering builders to remove water hardness minerals and 'build' the cleaning efficiency of the surfactant. They can also function as additives (e.g. in hand-washing liquids [RIVM, 2006]) or acids (e.g., in bathroom/ toilet cleaning liquids or silver polish).

Technical applications of citric acid and its salts in various industries as a complex-forming agent, cleaning agent, softening agent, decalcifying agent, de-rusting agent, corrosive agent and synergist in antioxidant mixtures accounted for 20% of the total production volume (500 000 tons/annum) in Europe (including Eastern Europe and Israel) in 1999 [HERA, 2005]. The total consumption of citric acid in household cleaning applications in the EEA (*i.e.*, EU + Iceland, Switzerland and Norway) in 2002 was 103 000 tons [HERA, 2005].

The concentration of citrate used in these applications varies. Concentrations of citrate (citric acid or trisodium citrate) in the most important consumer products are estimated as follows:

Dishwasher Tablets	up to <i>approx.</i> 40%
Dishwashing machine cleaner solid and liquid	up to 70%
Descaler solid and liquid	up to 70 %
Dishwasher Rinse Aids	0.5 - 5 %
Fabric care powder (phosphonate free)	2- 30%
Liquid fabric care (phosphonate free)	2 - 10%
Bath room cleaner, all purpose cleaner	up to 10 %
Toilet bowl cleaner	up to 10 %CAA

9.3.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.3.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.3.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC

(No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.3.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.3.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.3.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.3.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined

concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.3.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.7 Worker CS 7: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.3.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.8 Worker CS 8: Roller application or brushing; Liquid (PROC 10)

9.3.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.9 Worker CS 9: Treatment of articles by dipping and pouring; Liquid (PROC 13)**9.3.9.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.10 Worker CS 10: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness (PROC 2)

9.3.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	4E-3 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.11 Worker CS 11: Chemical production where opportunity for exposure arises; Solid, low dustiness (PROC 4)

9.3.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.12 Worker CS 12: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness (PROC 8a)

9.3.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.13 Worker CS 13: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness (PROC 8b)

9.3.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.14 Worker CS 14: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness (PROC 9)

9.3.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.3.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4 Exposure scenario 5: Widespread use by professional workers - Professional use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products

Product category used: PC 3: Air care products; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 3	Widespread use of functional fluid (indoor)	ERC 9a
CS 4	Widespread use of functional fluid (outdoor)	ERC 9b
Worker contributing scenario(s):		
CS 5	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 6	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 7	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 8	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 9	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 10	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 11	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 12	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 13	Manual activities involving hand contact; Indoor use; Solid, low dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, low dustiness	PROC 19

Further description of the use:

This scenario covers professional use of citric acid in cleaning products.

The large number of household products includes, but is not limited to:

- Laundry products: These include detergent powders, detergent liquids, laundry pre-treatment products and fabric softeners.
- Dish washing products: These are hand dishwashing liquids and machine dishwashing products (dishwashing powders/detergents and dishwashing liquids/rinse aids).
- All purpose cleaners: These are used in cleaning hard surfaces like windows, mirrors, wood, floors and tiled walls [RIVM, 2006]. The products can be liquid cleaners, spray cleaners or wet tissue application.
- Abrasive cleaners: These are used in remove soil which is firmly attached to the surface (e.g. lavatory pan, washbasins and kitchen sink/ working top) and can be powders, liquids or scouring pads [RIVM, 2006]
- Sanitary products: These are bathroom cleaners (sprays and liquids) and toilet cleaners.

- Floor, carpet and furniture products: These are products that provide a combined effect of cleaning and polishing.
- Metal polish: Consumer or professional use of, *e.g.*, silver polishes, either ready-to-use or solid preparations which need to be dissolved in water.
- Water treatment/scale inhibition products for household appliances.
- Vehicle care products.

9.4.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.3 Env CS 3: Widespread use of functional fluid (indoor) (ERC 9a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.4 Env CS 4: Widespread use of functional fluid (outdoor) (ERC 9b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.5 Worker CS 5: Roller application or brushing; Indoor use; Liquid (PROC 10)**9.4.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.6 Worker CS 6: Roller application or brushing; Outdoor use; Liquid (PROC 10)**9.4.6.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.4.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.7 Worker CS 7: Non-industrial spraying; Indoor use; Liquid (PROC 11)

9.4.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.8 Worker CS 8: Non-industrial spraying; Outdoor use; Liquid (PROC 11)

9.4.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.9 Worker CS 9: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.4.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid <i>Product ingredients mixed, diluted and/or suspended</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.10 Worker CS 10: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.4.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.11 Worker CS 11: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.4.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.12 Worker CS 12: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.4.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or

inhalation exposure to citric acid.

9.4.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, low dustiness (PROC 19)

9.4.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Ageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, low dustiness (PROC 19)

9.4.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) <i>e.g. Detergent powders and tablets</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.4.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.14 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, A generic concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5 Exposure scenario 6: Consumer use - Consumer use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Air care products	PC 3
CS 4	Polishes and wax blends	PC 31
CS 5	Washing and cleaning products	PC 35
CS 6	Water Softeners	PC 36

Further description of the use:

This scenario covers consumer use of citric acid in cleaning products.

9.5.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.3 Cons CS 3: Air care products (PC 3)

9.5.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 5 %	

9.5.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.4 Cons CS 4: Polishes and wax blends (PC 31)**9.5.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.5 Cons CS 5: Washing and cleaning products (PC 35)**9.5.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.5.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory

tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.6 Cons CS 6: Water Softeners (PC 36)

9.5.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.6.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.6 Exposure scenario 7: Widespread use by professional workers - Professional use of personal care products

Market sector: Personal care use

Product category used: PC 39: Cosmetics, personal care products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Worker contributing scenario(s):		
CS 2	Cosmetics, personal care products; Professional use	PROC 0

Further description of the use:

This scenario covers professional use of personal care products.

Citric acid and its salts are used in a wide range of personal care products, including: · Shampoos and conditioners · Astringent lotions · Bubble baths · Creams and lotions · Facial cleaners · Feminine hygiene products · Permanent wave neutraliser · Propellants for aerosol-type dispensers · Toothpastes · Mouth rinses · Body wash/cleanser · Hair colour and bleaching · Moisturisers · Hand soaps · Nail polish · Anti-aging products In these products, citric acid acts as clarifying agents, water softeners, buffers, foam boosters and stabilizers, complexing agents (for example to stabilize the formulation by complexing metal ions and preventing discoloration and decomposition). The human health effects of the end use of these products is exempt from REACH, however, the environmental impact must be assessed.

9.6.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.6.2 Worker CS 2: Cosmetics, personal care products; Professional use (PROC 0)

9.6.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario.

9.6.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The human health assessment is not considered for professional use of personal care products, since these are outside the scope of REACH.

9.7 Exposure scenario 8: Consumer use - Consumer use of personal care products

Market sector: Personal care use

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Cosmetics, personal care products; Consumer use	PC 39

Further description of the use:

This scenario covers consumer use of personal care products.

9.7.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.7.2 Cons CS 2: Cosmetics, personal care products; Consumer use (PC 39)

The human health assessment is not considered for consumer use of personal care products, since these are outside the scope of REACH.

9.7.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario. Outside the scope of REACH.

9.7.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.8 Exposure scenario 9: Use at industrial sites - Use in the Paper industry

Market sector: Use in the Paper industry

Product category used: PC 26: Paper and board treatment products

Sector of use: SU 6b: Manufacture of pulp, paper and paper products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid is used in the cleaning of papermaking machines and to prevent build up of deposits. Cleaning applications are covered under another exposure scenario; this scenario covers use of citric acid as an additive or processing aid in the paper-making industry.

Citric acid may be added to pulp slurry prior to bleaching to control paper staining by sequestering metal ions. Bleaching of pulp is usually carried out in several stages, typically 3-5. Each stage typically contains pumps, mixers, a washer, and a retention tower. Citric acid may be added prior to one or more stages. Opportunities for exposure may arise during mixing/blending and transfer operations.

It is possible that a small amount of citric acid is incorporated into the finished paper products. However, it is considered that releases from these products will be minimal compared to those from the paper manufacturing process and release from articles is not considered in this scenario.

Citric acid may also be used as additives in paper products, such as tobacco papers. The human health and environmental exposures resulting from use as an additive in paper-making are expected to be equivalent to or less than the exposures resulting from use as a processing aid in the paper industry. Therefore, the same exposure scenario is considered adequate to cover both uses. The human health aspects of end use effects of tobacco products are outside the scope of this assessment. Environmental exposures to citric acid resulting from this end use are not expected to be significant compared to losses from other sources examined in the exposure scenarios of this report and are not considered further.

9.8.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.8.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.8.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.8.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.8.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.8.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)**9.8.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.8.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.8.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid substance</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.8.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.8.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid substance</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.9 Exposure scenario 10: Use at industrial sites - Use in cement retardation products

Market sector: Use in cement retardation products

Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness	PROC 2
CS 8	Chemical production where opportunity for exposure arises; Solid, high dustiness	PROC 4
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness	PROC 8b

Subsequent service life exposure scenario(s):

ES13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Further description of the use:

Citric acid can be used to retard the setting rate of cement and reduce the amount of water needed. They may therefore be added to concrete, mortar, plaster, sealant and render formulations. The concentration of citric acid in these products is generally low (<1%).

Citric acid may be used in construction materials in industrial settings. This may include: mixing of citric acid (generally as part of a solid formulation) with cement and other ingredients to form concrete, mortar, plaster or render; and spreading, moulding or spraying of the product.

Cement-products containing citric acid may be used by members of the public (consumer use) and by workers at the commercial level e.g. skilled trades (professional use). This may include mixing, spreading, moulding or spraying operations. The citric acid may form part of a solid or liquid formulation.

Citric acid will remain in the concrete, mortar, plaster or render during its service life. Release is not intended, however, limited exposure is possible.

Both indoor and outdoor use of the formulations and articles is possible.

9.9.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.9.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)**9.9.2.1 Conditions of use**

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Closed continuous process with occasional controlled exposure	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.9.3.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.9.4.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.9.5.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for

substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.9.6.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.7 Worker CS 7: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness (PROC 2)

9.9.7.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Closed continuous process with occasional controlled exposure	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.9.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.8 Worker CS 8: Chemical production where opportunity for exposure arises; Solid, high dustiness (PROC 4)

9.9.8.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.9.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness (PROC 8a)

9.9.9.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.9.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness (PROC 8b)

9.9.10.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.9.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10 Exposure scenario 11: Widespread use by professional workers - Professional use in cement retardation products

Market sector: Use in cement retardation products

Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 4	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 5	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 6	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 7	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 8	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 9	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 10	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 11	Tabletting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness	PROC 14
CS 12	Tabletting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness	PROC 14
CS 13	Manual activities involving hand contact; Indoor use; Solid, high dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, high dustiness	PROC 19
CS 15	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness	PROC 21
CS 16	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness	PROC 21

Subsequent service life exposure scenario(s):

ES14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Further description of the use:

This scenario cover professional use in cement retardation products.

9.10.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.3 Worker CS 3: Roller application or brushing; Indoor use; Liquid (PROC 10)**9.10.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.4 Worker CS 4: Roller application or brushing; Outdoor use; Liquid (PROC 10)**9.10.4.1 Conditions of use**

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.5 Worker CS 5: Non-industrial spraying; Indoor use; Liquid (PROC 11)**9.10.5.1 Conditions of use**

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.6 Worker CS 6: Non-industrial spraying; Outdoor use; Liquid (PROC 11)**9.10.6.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.7 Worker CS 7: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.10.7.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.10.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.8 Worker CS 8: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.10.8.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable

risk to humans from eye or inhalation exposure to citric acid.

9.10.9 Worker CS 9: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.10.9.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.10 Worker CS 10: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.10.10.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.10.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.11 Worker CS 11: Tableting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness (PROC 14)

9.10.11.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^\circ\text{C}$	TRA Workers 3.0

9.10.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.12 Worker CS 12: Tableting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness (PROC 14)

9.10.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, high dustiness (PROC 19)

9.10.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 % <i>The concentration of citrate in these products is generally low (<1%).</i>	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.10.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	20 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, high dustiness (PROC 19)

9.10.14.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.15 Worker CS 15: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness (PROC 21)

9.10.15.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	8 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.16 Worker CS 16: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness (PROC 21)

9.10.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.10.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	5.6 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11 Exposure scenario 12: Consumer use - Consumer use in Cement retardation products

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
CS 2	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
Consumer contributing scenario(s):		
CS 3	Cement retardation products; indoor use	PC 0
CS 4	Cement retardation products; outdoor use	PC 0

Subsequent service life exposure scenario(s):

ES15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Further description of the use:

This scenario covers consumer use in cement retardation products.

9.11.1 Env CS 1: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.2 Env CS 2: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.3 Cons CS 3: Cement retardation products; indoor use (PC 0)

9.11.3.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	

9.11.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11.4 Cons CS 4: Cement retardation products; outdoor use (PC 0)**9.11.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	

9.11.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12 Exposure scenario 13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Market sector: Use in cement retardation products

Article categories:

AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES10: Use at industrial sites - Use in cement retardation products

Further description of the use:

This scenario covers the industrial service life of articles which may contain residual registration substance in cement retardation products.

9.12.1 Env CS 1: Service life - workers; Industrial (ERC 12b), ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.12.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.12.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.13.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.12.3.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.12.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.12.4.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.12.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.12.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.12.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13 Exposure scenario 14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Market sector: Use in cement retardation products

Article categories:

AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES11: Widespread use by professional workers - Professional use in cement retardation products

Further description of the use:

This scenario covers the professional service life of articles which may contain residual registration substance in cement retardation products.

9.13.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.13.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.13.2.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Indoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.13.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.13.3.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	TRA Workers 3.0
Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
Place of use: Outdoor	TRA Workers 3.0
Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.13.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.13.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.13.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.13.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.13.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14 Exposure scenario 15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Cement retardation products; Indoor	AC 0
CS 3	Cement retardation products; Outdoor	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES12: Consumer use - Consumer use in Cement retardation products

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in cement retardation products.

9.14.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.14.2 Cons CS 2: Cement retardation products; Indoor (AC 0)

9.14.2.1 Conditions of use

	Method
Product (article) characteristics	
Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low (<1%).</i>	

9.14.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14.3 Cons CS 3: Cement retardation products; Outdoor (AC 0)**9.14.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>The concentration of citrate in these products is generally low ($<1\%$).</i>	

9.14.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.15 Exposure scenario 16: Use at industrial sites - Use in polymers and plastics**Market sector:** Use in polymers and plastics**Product category used:** PC 32: Polymer Preparations and Compounds**Sector of use:** SU 11: Manufacture of rubber products; SU 12: Manufacture of plastics products, including compounding and conversion

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid and citrate salts may be used as a component of blowing agents in the manufacture of foamed thermoplastics. This application, described below, should be taken as representative of where and why citric acid or citrate salts may be used within the plastics and polymers industry; other applications are possible.

Polyolefin foams are used for a variety of applications such as automotive, construction, food packaging, sport and leisure, and many other industrial and consumer uses. They usually have a high strength to weight ratio and are manufactured in a variety of processes and in low density (25 - 250 kg/m³) or high density (250 - 700 kg/m³) versions, or even in densities as low as 16 kg/m³ for polystyrene. All current extrusion processes involve the following steps: melting, mixing with blowing agents, cooling of melt, expansion and degassing/aging. The steps in this process can be realized in different configurations of equipment, *e.g.*, with long single-screw extruders, twin-screw extruders, or tandem extruder lines. The choice of chemical or physical blowing agents depends on the foam density to be reached (*e.g.* the foam application) and influences the necessary foaming equipment and the costs of the foamed materials. High-density thermoplastic foams based on, *e.g.*, polypropylene or polystyrene, may be produced using blowing agents which decompose to generate gas which is soluble in the melt but which is released as the pressure is reduced (*e.g.*, by passing through a dye) to produce a foam. The foaming process is complex but involves bubble nucleation followed by bubble growth.

One example of a commercially used chemical foaming agent is based on citric acid (or monosodium citrate) in combination with sodium carbonate or (sodium bicarbonate) in a weight ratio of between about 1:1 and about 5:1 respectively [US 5 302 455]. The citric acid/sodium bicarbonate system decomposes at 160 – 210°C to release 120 cm³/g of CO₂. [Karger-Kocsis, 1999; Brydson, 1999; Holmberg, 2002]

Both citric acid (or citrate salt) and (bi)carbonate may be surface-treated with, for example, a fatty acid ester to make them compatible with the polyolefin. A concentrated master batch of the formulated foaming agent in polymer at loading levels of from about 5% to about 50% actives may then be prepared. The master batch is added to the polymer melt which is to be foamed such that the blowing agents are at 0.1 to 2.0% active levels in the final formulation [US 5 302 455 and refs. therein]. The pre-treatment formulation and foaming processes are typically closed or open batch

processes. The citrate is typically present as a solid prior to mixing with the polymer melt. By-products of this reaction are mono-, di-, and/or trisodium citrate, in combination with other sodium salts, which will still be present within the foamed polymer. These residues are typically present at around 50 wt.% of the initial foaming agent formulation which is equivalent to <1 wt.% of the total foamed polymer in most cases [RAPRA, 2004]. No citric acid is present in the final polymer.

9.15.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.15.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.15.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.15.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)**9.15.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.15.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.15.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.15.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.15.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 % <i>transfer of solid</i>	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.15.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16 Exposure scenario 17: Use at industrial sites - Use in scale inhibition in oilfield water systems

Market sector: Use in scale inhibition in oilfield water systems

Product category used: PC 35: Washing and Cleaning Products; PC 37: Water treatment chemicals

Sector of use: SU 2a: Mining (without offshore industries); SU 2b: Offshore industries

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines.

This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place. Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.16.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.16.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.16.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.16.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.16.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.16.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local): Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)**9.16.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.16.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.16.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.16.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17 Exposure scenario 18: Use at industrial sites - Use in the textiles industry

Market sector: Use in the textiles industry

Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 23: Leather treatment products; PC 34: Textile dyes and impregnating products

Sector of use: SU 5: Manufacture of textiles, leather, fur

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

The OECD Emission Scenario Document on the Textile Finishing Industry [OECD, 2004A] describes the textile industry as “one of the largest and most complicated industrial chains in manufacturing industry”. The industry is dominated by small and medium-sized companies, working in three main sectors: clothing, home furnishings and industrial. Activity in the textile finishing industry is distributed across the EU, but (within the EU-15) the dominant Member State is Italy, accounting for around 36% of production, followed by German (approx. 13%), France (approx. 12%), the UK and Spain (approx. 10% each). The overall market for textiles, including yarn production and carpets, is also dominated by Italy, with around a 30% market share (EC, 2002). Similarly, for leather, the most important producer and transformer in Europe is Italy (84% of all companies), followed by Spain [OECD, 2004B]. Within the textile and leather finishing industries, citric acid and related salts may be used in a wide variety of applications. However, these uses may be summarized (albeit with some overlap) as being based on either acidity (and pH regulation) or the ability to complex metal ions. Examples of applications where these are important are: • Acidification of flame-retardant treating baths • Curing catalyst for treatments such as easy-care resins • Sequestering of alkaline earth or transition metal ions to prevent interference in dyeing and other processes. Potential exposure to humans and especially the environment is dependent on the intended function of the substance, as well as the substrates and processes used. Functional finishing agents and other chemically reactive substances are intended to be consumed during use; therefore the amount released is related to the efficiency of the process. On the other hand, non-reacting substances (e.g. processing aids) are not consumed and will ultimately be lost to air or waste water, depending on their function and physicochemical properties. In virtually all cases, it is expected that citric acid or citrate salts, as process aids, will be lost to waste water. The following applications should be taken as representative rather than exhaustive examples of where and why citric acid or citrates may be used within the textile and leather finishing industries. Further details of these examples may be found in European Commission Reference Document on Best Available Techniques for the Textiles Industry [BREF, 2003]. Flame Retardants: Potassium salts of fluoro complexes of zirconium (potassium hexafluorozirconate) are typically used as flame retardants for wool and wool-blend fibres. Typical

application conditions for carpet wool yarn are as follows:• Rinse to remove unwanted salts / anions. • Bath set up at 20 – 30°C and pH 3: citric acid (4 % on weight of fabric) may be used. • Addition of potassium hexafluorozirconate dissolved in hot water. • Temperature raised at 1 – 2 K per minute to 60°C and held at this temperature for 30 minutes • Rinse in cold water for 10 - 20 minutes. Durable Press Resins: Cellulosic fabrics such as cotton or its blends are often treated with a finish which prevents wrinkling and shrinkage during laundering and drying. These finishes are known by a variety of names: easy-care, wash-and-wear finishing, no-iron, wrinkle resistant etc. Recipes for resin-finishing liquors are in general aqueous solutions or dispersions which consist of a cross-linking resin, a catalyst, a wetting agent/emulsifier (mainly a non-ionic surfactant) plus a number of additives. Cross-linking resin systems are often based on urea-formaldehyde or melamine-formaldehyde. The most commonly used catalyst is magnesium chloride. In many cases liquid mixtures are used, which are based on magnesium chloride plus an organic acid such as citric acid. Catalyst is used at 10 – 30 % of the weight of the cross-linking resin, which is itself used in the range of 5% (for blends) up to 12% (for 100% cotton) on the weight of the fabric. A typical bath may contain: cross-linking resin, 50 g/l; catalyst (MgCl₂), 7 g/l; and acid, 0.5 g/l. Pre-treatment and Dyeing: The presence of ions of alkaline earth metals (calcium and magnesium) and/or other metals (especially iron) may have negative effects on various wet processes not only in pre-treatment (e.g. catalytic destruction of hydrogen peroxide) but also in dyeing. Purified and softened water is used in textile finishing mills but often this is not enough and specific auxiliary formulations containing metal complexing agents need to be added to the baths. Typical sequestering agents which have been used are polyphosphates, phosphonates, and amino carboxylic acids (e.g., EDTA). The main concerns associated with the use of these substances arise from their N- and P-content, their often-low biodegradability/bio-eliminability, and their ability to form stable complexes with metals (the very reason they are used in the first place!), which may lead to remobilisation of heavy metals in effluent or downstream sediments. Hydroxy-carboxylic acids (e.g., gluconates, citrates) are convenient alternatives to the above named conventional sequestering agents. None of these substances contains N or P in their molecular structure. In addition, hydroxy-carboxylic acids are readily biodegradable. A typical hydrogen peroxide-based bleaching formulation for cotton (or its blends) will use 0 – 20 g sequestering agent per kg of textile being treated. For bleaching of wool, 5 – 30 g/kg may be used. For dyeing of cellulosic fabrics, 1 – 3 g/litre of sequestering agent may be used.

9.17.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.17.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.17.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.17.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.17.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.17.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.17.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.17.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.44 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)**9.17.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.6 Worker CS 6: Treatment of articles by dipping and pouring; Liquid (PROC 13)**9.17.6.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.17.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.18 Exposure scenario 19: Use at industrial sites - Industrial use of coatings and paints

Market sector: Use in coatings and paints

Product category used: PC 9a: Coatings and Paints, Thinners, paint removers

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Subsequent service life exposure scenario(s):

ES22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Further description of the use:

The term “coatings” as used in this document describes any material that can be applied to a surface as a thin continuous, layer (film). This includes paints, lacquers or varnishes. Such coatings are used in a wide range of application to protect surfaces from corrosion and other environmental effects, provide decorative effects and improve inherent performance properties. Film formation can be a physical process, where solvents evaporate from solutions or melted substances solidify, or a chemical process involving reactions between reactive groups in binders [OECD, 2007].

The application of a coating to a surface can be by manual use of brush/roller, spraying systems, and dip or roll coating systems [OECD, 2007]. The type and constituent composition of the coating product are based on the substrate, intended use, service environment and the desired role of coating. Decorative coatings cover the use of paints applied to buildings, their trim and fittings and for decorative and protective purposes by both professionals and the general public. All decorative coatings are supplied as liquid materials [OECD, 2007].

Titanium dioxide (TiO₂) is the most important inorganic pigment in terms of quantity. The world production in 2000 amounted to nearly 4 million tonnes per year. Titanium dioxide white inorganic pigments are used primarily in the production of paints, printing inks, paper and plastic products. Titanium dioxide is of outstanding importance as a white pigment because of its scattering properties, its chemical stability, and lack of toxicity [BREF, 2007]. Citrates may be used to retard the settling of titanium dioxide in aqueous dispersions.

The following application should be taken as representative rather than the sole example of where and why citric acid or citrates may be used within the coatings industry.

Anti-settling of Pigment: In the paint industry citric acid and citrate salts are used to retard the settling of titanium dioxide, the most common pigment used in paints and other coatings [APAC, 2009]. Shipping of titanium dioxide as an aqueous slurry has advantages in handling and storage space versus shipping as a fine solid. Although titanium dioxide particles will initially disperse in water, they separate rapidly and in a short time will form a hard-packed sediment which is virtually

impossible to re-disperse. The presence of ions such as calcium or iron causes flocculation, which exacerbates the problem. In the early 1970s, it was discovered that addition of 0.04 – 0.4% citric acid or tartaric acid or their simple salts (sodium, potassium, ammonium) substantially retarded the settling and packing of titanium dioxide particles in aqueous dispersions [US 3 663 284].

At least a portion of the citric acid added to aid shipment of the pigment is likely to still be present during formulation of the paint. Indeed, it is possible that further additions are made to allow re-dispersion of pigment in the final paint formulation.

9.18.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.18.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.18.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see “risk characterisation” section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see “risk characterisation” section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.18.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.18.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.18.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation

(EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.18.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.18.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)**9.18.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.18.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.18.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.18.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.18.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19 Exposure scenario 20: Widespread use by professional workers - Professional use in paints and coatings

Market sector: Use in coatings and paints

Product category used: PC 9a: Coatings and Paints, Thinners, paint removers

Sector of use: SU 18: Manufacture of furniture; SU 19: Building and construction work

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Manual activities involving hand contact; Liquid	PROC 19
CS 6	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Subsequent service life exposure scenario(s):

ES23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Further description of the use:

This scenario covers professional use in paints and coatings.

9.19.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)**9.19.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.19.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)**9.19.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.19.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.5 Worker CS 5: Manual activities involving hand contact; Liquid (PROC 19)**9.19.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.6 Worker CS 6: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.19.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.19.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20 Exposure scenario 21: Consumer use - Consumer use in paints and coatings**Market sector:** Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Coatings and paints, thinners, paint removers; Liquid	PC 9a
CS 4	Coatings and paints, thinners, paint removers; Solid, medium dustiness	PC 9a

Subsequent service life exposure scenario(s):

ES24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Further description of the use:

This scenario covers consumer use in paints and coatings.

9.20.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.3 Cons CS 3: Coatings and paints, thinners, paint removers; Liquid (PC 9a)**9.20.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	

9.20.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of

ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20.4 Cons CS 4: Coatings and paints, thinners, paint removers; Solid, medium dustiness (PC 9a)

9.20.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.20.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21 Exposure scenario 22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Market sector: Use in coatings and paints

Article categories:

AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES19: Use at industrial sites - Industrial use of coatings and paints

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance in coatings or paints.

9.21.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.21.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.21.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.21.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.21.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.21.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.21.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.21.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.21.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.21.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22 Exposure scenario 23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Market sector: Use in coatings and paints

Article categories:

AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES20: Widespread use by professional workers - Professional use in paints and coatings

Further description of the use:

This scenario covers the professional service life of articles that may contain residual registration substance in coatings or paints.

9.22.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.22.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.22.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.22.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.22.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.22.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.22.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.22.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.22.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.22.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.23 Exposure scenario 24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Market sector: Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Paints and coatings	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES21: Consumer use - Consumer use in paints and coatings

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in coatings or paints.

9.23.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.23.2 Cons CS 2: Paints and coatings (AC 0)

9.23.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$	

9.23.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.24 Exposure scenario 25: Use at industrial sites - Industrial use in photographic processing

Market sector: Use in photographic processing

Product category used: PC 30: Photo-chemicals

Environment contributing scenario(s):		
CS 1	Use of reactive processing aid at industrial site (no inclusion into or onto article)	ERC 6b
Worker contributing scenario(s):		
CS 2	Mixing or blending in batch processes; Liquid	PROC 5
CS 3	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 4	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 5	Treatment of articles by dipping and pouring; Solid, medium dustiness	PROC 13

Further description of the use:

Citric acid is one of a range of complexing agents used in photography to control the effects of calcium and magnesium hardness, and to keep iron soluble in solution as part of redox processes.

Due to the rapid growth of digital photography, use of chemicals in film processing is now limited almost entirely to a small number of professional providers. The chemicals used are collected by photochemical companies in order to recover silver and disposal to drain does not take place.

Citrate may also be used as a stop bath in professional or consumer settings as part of the process for the manual development of photographic film.

The film is removed from the camera and wound onto a reel in darkroom or a lightproof bag. The reel is placed in a light-proof tank and a succession of aqueous solutions is added. Sheet film may be processed by placing the film in a succession of trays containing the appropriate solutions.

The film is pre-soaked in water and then soaked in the developer to convert the latent image to a visible image. The developer is normally alkaline, so a mild acid such as citric acid will neutralize it; this is called a stop bath. The image is then fixed and the film is washed and dried.

The citric acid stop bath may be purchased pre-formulated or mixed from citric acid powder and other ingredients.

9.24.1 Env CS 1: Use of reactive processing aid at industrial site (no inclusion into or onto article) (ERC 6b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.24.2 Worker CS 2: Mixing or blending in batch processes; Liquid (PROC 5)**9.24.2.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.24.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.3 Worker CS 3: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.24.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.24.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.4 Worker CS 4: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.24.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.24.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.5 Worker CS 5: Treatment of articles by dipping and pouring; Solid, medium dustiness (PROC 13)

9.24.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.24.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.25 Exposure scenario 26: Consumer use - Consumer use in photographic processing

Market sector: Use in photographic processing

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Photo-chemicals	PC 30

Further description of the use:

This scenario covers consumer use in photographic processing.

9.25.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.25.2 Cons CS 2: Photo-chemicals (PC 30)

9.25.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 5 %	

9.25.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.26 Exposure scenario 21: Use at industrial sites - Industrial use as an anti-scalant, complexing agent in water treatment systems

Market sector: Use as an anti-scalant, complexing agent in water treatment systems

Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 36: Water softeners; PC 37: Water treatment chemicals

Environment contributing scenario(s):		
CS 1	Industrial use as an anti-scalant, complexing agent in water treatment systems	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 6	Industrial spraying; Liquid	PROC 7
CS 7	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 8	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines. This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place. Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.26.1 Env CS 1: Industrial use as an anti-scalant, complexing agent in water treatment systems (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)**9.26.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.26.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.5 Worker CS 5: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.26.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.6 Worker CS 6: Industrial spraying; Liquid (PROC 7)**9.26.6.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.26.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.26.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>Transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.9 Worker CS 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.26.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.26.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27 Exposure scenario 28: Use at industrial sites - Industrial use of treatment of metal surfaces

Market sector: Treatment of metal surfaces

Product category used: PC 7: Base metals and alloys; PC 14: Metal surface treatment products

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 5	Industrial spraying; Liquid	PROC 7
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 8	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 9	Roller application or brushing; Liquid	PROC 10
CS 10	Treatment of articles by dipping and pouring; Liquid	PROC 13

Subsequent service life exposure scenario(s):

ES29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Further description of the use:

Citric acid may be used as a complexing agent during metal surface treatment operations. The following applications should be taken as representative rather than the sole example of where and why citric acid or citrates may be used in the treatment of metal surfaces. Some industries using citric acid include fasteners, medical devices, semi-conductors, automotive and aerospace.

Passivation: Citric acid may be used in stainless steel passivation to assist oxidation of the surface of the stainless steel and prevent later corrosion. After thorough cleaning, the stainless steel part is immersed in a passivating acid bath. Any one of three approaches can be used: nitric acid passivation, nitric acid with sodium dichromate passivation and citric acid passivation. Which approach to use depends on the grade of stainless steel and prescribed acceptance criteria. When citric acid passivation is used, typical solutions range from 4 to 10% citric acid by weight.

Electroless plating: Plating describes the coating of surfaces with metals, either through an electrolysis or electroless plating processes. Electroless plating is also known as 'autocatalytic' plating; deposition of the metal starts on metal nuclei such as palladium and continues autocatalytically. Electroless plating is favoured over electrolysis for most component production (EA 2009).

There are usually three stages in the electroless plating process: de-smearing, activation and electroless copper plating. The plating solution has a copper content of 2 – 5 g/l, with sodium hydroxide (15 – 20 g/l), complexing agents (10 – 15 g/l) or tartrates (5 – 10 g/l) and reducing agents, such as formaldehyde (3 – 5 g/l). The process solution lifetime is limited by the build-up of reaction products and is proportional to the rate of throughput of components (EA 2009). Citrate may be used as a complexing agent.

Electroless plating involves the large-scale use of water in both providing the medium for the process itself and for the subsequent rinsing and washing of components. There is a degree of recycling of rinse water through use to top-up the plating tanks, but there is ultimately loss through carry-over on components. Spent fluids can only be topped up a limited number of times before the media needs replacing. Water-soluble waste is discharged in waste water for basic on-site treatment (settling and pH adjustment) before discharge to municipal treatment works, controlled by local discharge consent agreements (EA 2009).

9.27.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.27.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.27.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no

unacceptable risk to human health from storage or handling of citric acid.

9.27.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.27.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.4 Worker CS 4: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.27.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.5 Worker CS 5: Industrial spraying; Liquid (PROC 7)

9.27.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.27.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.27.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.8 Worker CS 8: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.27.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.27.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.9 Worker CS 9: Roller application or brushing; Liquid (PROC 10)

9.27.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.27.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.10 Worker CS 10: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.27.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.28 Exposure scenario 29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Market sector: Treatment of metal surfaces

Article categories:

AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):

ES28: Use at industrial sites - Industrial use of treatment of metal surfaces

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance on treated metal surfaces.

9.28.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.28.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.28.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>Assumed as a reasonable worst-case for residual citric acid on the metal surface.</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.28.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.28.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>Assumed as a reasonable worst-case for residual citric acid on the metal surface.</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.28.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.28.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>Assumed as a reasonable worst-case for residual citric acid on the metal surface.</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.28.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.28.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 1\%$ <i>Assumed as a reasonable worst-case for residual citric acid on the metal surface.</i>	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] <i>Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No <i>Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.</i>	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.28.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.

No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.29 Exposure scenario 30: Use at industrial sites - Cleaning of metal surfaces**Market sector:** Cleaning of metal surfaces**Product category used:** PC 35: Washing and Cleaning Products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9
CS 6	Roller application or brushing; Liquid	PROC 10
CS 7	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

Citric acid may be used as cleaning of circuit boards prior to soldering, and metal cleaning or chemical polishing for the surface treatment of aluminium, copper and other metals.

9.29.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.29.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)**9.29.2.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.29.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.29.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.29.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.29.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) <i>transfer of solid</i>	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.29.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.5 Worker CS 5: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC 9)

9.29.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.6 Worker CS 6: Roller application or brushing; Liquid (PROC 10)

9.29.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.29.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.7 Worker CS 7: Treatment of articles by dipping and pouring; Liquid (PROC 13)**9.29.7.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.29.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30 Exposure scenario 31: Use at industrial sites - Use in agricultural applications**Market sector:** Use in agricultural applications**Product category used:** PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 6	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 7	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 8	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 9	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citrate complexes of iron, copper, magnesium, manganese and zinc are used to correct soil deficiencies of these minerals because they are soluble in water at normal soil pH. The soluble citrate complex promotes the transfer of the metal nutrient into the plant's root or leaf system. The biodegradability of citric acid is important for this application (APAC 2009).

One common method for making fertilisers involves dissolving metal sulfates in water and citric acid followed by neutralization with ammonia. This process may be carried out in an industrial setting as part of the formulation of solid or liquid fertilisers/plant feeds. In this case, citric acid is an intermediate and it is the metal-citrate or ammonium citrate that must be considered for the professional or consumer use of fertilisers/plant feeds. Magnesium citrate may be used in this context. Alternatively, mixing of fertilisers may take place on farms. In this case, exposure may be to solid or liquid citric acid or metal-citrate (including sodium citrate).

Citrates may also be present as dispersant/scale inhibiting agents, i.e. adjuvants in the preparation. Evidence from other applications in which citrate is acting as a scale control agent/dispersant suggests that citrate may be present at very low levels in the formulation, perhaps *approx.* 1-20 ppm.

In any of the above cases, marketed products may be solid (granules or pellets) or solution. Processes used may include transfer, loading, mixing, rolling/brushing and spraying.

Plant feeds containing citrates may also be used in professional or consumer settings. The products may be liquids or granules and may be sprayed or poured.

Citrates may also be used in plant protection products and in animal feed; however, these applications fall outside the scope of REACH.

9.30.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.30.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)**9.30.2.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)**9.30.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.30.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.30.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: $\leq 100\%$	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: $\leq 40^{\circ}\text{C}$	TRA Workers 3.0

9.30.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is $5.78\text{E-}6$ Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.6 Worker CS 6: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.30.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.7 Worker CS 7: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.30.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.30.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.30.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.30.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31 Exposure scenario 32: Widespread use by professional workers - Professional use in agricultural applications

Market sector: Use in agricultural applications

Product category used: PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Use as laboratory reagent; Liquid	PROC 15
CS 6	Tabletting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness	PROC 14
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15
CS 8	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

This scenario covers professional use in agricultural applications in liquid products.

9.31.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)**9.31.3.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.31.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)**9.31.4.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.31.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.5 Worker CS 5: Use as laboratory reagent; Liquid (PROC 15)**9.31.5.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.31.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.6 Worker CS 6: Tableting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness (PROC 14)

9.31.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.31.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)**9.31.7.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.31.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is "low hazard".

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.8 Worker CS 8: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.31.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.32 Exposure scenario 33: Consumer use - Consumer use in agricultural applications

Market sector: Use in agricultural applications

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Consumer contributing scenario(s):		
CS 3	Fertilizers	PC 12

Further description of the use:

This scenario covers consumer use in agricultural applications.

9.32.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.3 Cons CS 3: Fertilizers (PC 12)

9.32.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 5 %	

9.32.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.33 Exposure scenario 34: Use at industrial sites - Laboratory reagent**Market sector:** Laboratory reagent**Product category used:** PC 21: Laboratory Chemicals

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15

Further description of the use:

Citric acid may be used at low levels within laboratories.

9.33.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.33.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.33.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.33.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.33.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.33.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.33.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.33.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m³ and as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.33.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)**9.33.7.1 Conditions of use**

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: ≤ 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: ≤ 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] <i>Required as a qualitative risk management measure for short term inhalation exposure.</i>	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes <i>Required as a qualitative risk management measure for local eye exposure.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: ≤ 40°C	TRA Workers 3.0

9.33.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m ³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

Certificate CN20/10866

SGS

Seven Star Lemon Technology Co., Ltd.

has implemented and maintains a Feed Safety and Quality Management System
including Good Manufacturing Practice (GMP) in compliance with:

FAMI-QS Code

(Version 6, 2018-10-02)

On the following site/s

The south of South Second Ring Road and the west of Xuyao Road,
Lushan Project Area, Economic Development Zone, Yishui County,
Linyi City, Shandong Province, P. R. China
FAMI-QS Site Registration: FAM-1687-01

For Production of Specialty Feed Ingredients

From Chemical and Bioprocessing Process

Feed Chain Category K

The Operator implements measures for feed fraud/feed defence according to the
FAMI-QS Feed Fraud Prevention and Defence Module Version 1

This certificate is valid from 09 November 2023 until 08 November 2026
and remains valid subject to satisfactory surveillance audits.

Date of Certification decision 19 September 2023

Re certification audit due before 08 September 2026

Issue 3. Certified since 09 November 2020

For the validity of this certificate please check www.fami-qs.org

Authorised by

Jian Wang

Jian Wang
Director -Health & Nutrition

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VEGAN VEGETARIAN STATEMENT / OŚWIADCZENIE WEGAN I WEGETARIAN

Product name/ Nazwa produktu:	CITRIC ACID MONOHYDRATE
Manufacturer/ Producent	SEVEN STAR LEMON TECHNOLOGY CO., LTD.

Hereby we confirm above mentioned product does not contain animal ingredients or animal by-products, does not use animal ingredients or by-products in the manufacturing process so our product is suitable for:

Niniejszym potwierdzamy, że powyższy produkt nie zawiera składników pochodzenia zwierzęcego ani produktów ubocznych pochodzenia zwierzęcego, nie wykorzystuje składników pochodzenia zwierzęcego ani produktów ubocznych pochodzenia zwierzęcego w procesie produkcji, dzięki czemu nasz produkt nadaje się do

- ☒ vegetarian/wegański
- ☒ vegan/wegan
- ☒ ovo-lacto-vegetarian/ovo-lacto-wegetarian
- ☒ Lacto-vegetarian/ lakto-wgetarian

02-12-2024

Date/data:

SEVEN STAR LEMON TECHNOLOGY CO., LTD.
七星柠檬科技有限公司
(company stamp, sign/ pieczęć i podpis)