o-xylene

Safety Data Sheet

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Revision date: 31 October 202 Supersedes version of: 23 June 2022 Version: 7.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	:	Substance
Trade name	:	o-xylene
Chemical name	:	o-xylene
EC Index-No.	:	601-022-00-9
EC-No.	:	202-422-2
CAS-No.	:	95-47-6
REACH registration No	:	01-2119485822-30
Product code	:	P080
Formula	:	C8H10
Product group	:	Trade product

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Relevant identified uses

Use of the substance/mixture	:	Utilized as reactant for Phthalic anidride's and plasticizer's production. Flexible PVC, dyes, insecticides and pharmaceuticals

Title	Use descriptors
Use at industrial sites. Use as an intermediate (ES Ref.: ES3)	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC28, ERC6a
Use at industrial sites. Uses in coatings (ES Ref.: ES4)	PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28, ERC4
Formulation or re-packing - Formulation (ES Ref.: ES2)	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC28, ERC2

Full text of use descriptors: see section 16

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Only Representative:
Braskem Netherlands B.V.
Weena 240 / Tower C 9th Floor
3012 NJ Rotterdam -The Netherlands
T 31 107985002
productsafety@braskem.com

1.4. Emergency telephone number

Emergency number	:	1 703-741-5970 (Chemtrec –24h)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flammable liquids, Category 3	H226
Acute toxicity (dermal), Category 4	H312
Acute toxicity (inhal.), Category 4	H332
Skin corrosion/irritation, Category 2	H315
Serious eye damage/eye irritation, Category 2	H319
Specific target organ toxicity – Single exposure, Category 3, Respiratory tract irritation	H335
Aspiration hazard, Category 1	H304
Hazardous to the aquatic environment – Chronic Hazard, Category 3	H412

Full text of H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

Flammable liquid and vapour. May be fatal if swallowed and enters airways. Harmful in contact with skin or if inhaled. Causes skin irritation. May cause respiratory irritation. Harmful to aquatic life with long lasting effects.

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

GHS02 GHS07 GHS08

Signal word (CLP) : Danger

Hazard statements (CLP) : H226 - Flammable liquid and vapour.
H304 - May be fatal if swallowed and enters airways.
H312+H332 - Harmful in contact with skin or if inhaled.
H315 - Causes skin irritation.
H319 - Causes serious eye irritation.
H335 - May cause respiratory irritation.
H412 - Harmful to aquatic life with long lasting effects.

Precautionary statements (CLP) : P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 - Avoid breathing dust, fume, gas, mist, spray, vapours.
P273 - Avoid release to the environment.
P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water .
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%
o-xylene	CAS-No.: 95-47-6 EC-No.: 202-422-2 EC Index-No.: 601-022-00-9 REACH-no: 01-2119485822-30	98

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove casualty to fresh air and keep warm and at rest. In case of irregular breathing or respiratory arrest provide artificial respiration. In case of breathing difficulties administer oxygen. Immediately get medical attention.

First-aid measures after skin contact : For even minor contact, immediately remove contaminated clothing. Wash skin thoroughly with mild soap and water. Rinse immediately with plenty of water (for at least 15 minutes). Immediately get medical attention. Discard contaminated clothing.

First-aid measures after eye contact : In case of contact, immediately rinse eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately get medical attention.

First-aid measures after ingestion : Remove casualty to fresh air and keep warm and at rest. Do not induce vomiting. If swallowed, rinse mouth with water (only if the person is conscious). Give water to drink if victim completely conscious/alert. Never give anything by mouth to an unconscious person. Immediately get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects : Headache. Nausea. Dizziness. Drowsiness. Loss of consciousness. Vomiting.

Symptoms/effects after inhalation	:	Harmful if inhaled. Inhalation may affect the nervous system causing headache, possibly dizziness, nausea, weakness, loss of coordination and unconsciousness. Acute exposure to high doses or chronic exposure can cause pulmonary damages, liver, kidneys and neurological disorders. Aspiration of this material may cause chemical pneumonia.
Symptoms/effects after skin contact	:	Harmful in contact with skin. Causes skin irritation. Prolonged/repetitive skin contact may cause skin defattening or dermatitis. Repeated exposure may cause skin dryness or cracking. Redness. burning.
Symptoms/effects after eye contact	:	Irritating to eyes. May cause destruction of eye tissue.
Symptoms/effects after ingestion	:	May be fatal if swallowed and enters airways. Depression of the central nervous system, headaches, dizziness, drowsiness, loss of coordination. Pulmonary oedema.
Chronic symptoms	:	Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Carbon dioxide (CO2), dry chemical powder, foam. Water fog.
Unsuitable extinguishing media	:	Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard	:	Flammable liquid and vapour. On combustion forms: Carbon monoxide. Carbon dioxide. Formaldehyde.
Explosion hazard	:	Vapours can form explosive mixtures with air. Vapour heavier than air may travel considerable distance to a source of ignition and flash back.
Hazardous decomposition products in case of fire	:	Thermal decomposition may produce : carbon oxides. Formaldehyde.

5.3. Advice for firefighters

Firefighting instructions	:	Do not approach fire except upwind and only with proper skin and respiratory protection (supplied air only). Cool closed containers exposed to fire with water spray.
Protective equipment for firefighters	:	Extra personal protection: complete protective clothing including self-contained breathing apparatus. In case of fire: Wear self-contained breathing apparatus. Refer to chapter 8.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	:	Evacuate unnecessary personnel. Ventilate spillage area.

6.1.1. For non-emergency personnel

Protective equipment	:	Wear recommended personal protective equipment. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures	:	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

6.1.2. For emergency responders

Protective equipment	:	Wear recommended personal protective equipment. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures	:	Eliminate leaks immediately. Eliminate all ignition sources if safe to do so. Ventilate affected area. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

6.2. Environmental precautions

Use water spray jet to minimise or disperse vapours. Do not flush down sewers. Do not allow run-off from fire fighting to enter drains or water courses. Collect contaminated extinguishing water separately and must not enter the sewage system. If the product enters drains or sewers the local water company should be contacted immediately; in the case of contamination of streams, rivers or lakes, the National Rivers Authority.

6.3. Methods and material for containment and cleaning up

For containment	:	Soak up with inert absorbent material (for example sand, sawdust, a universal binder, silica gel).
Methods for cleaning up	:	Prevent spread over a wide area (e.g. by containment or oil barriers). Collect spillage.
Other information	:	Granulated activated charcoal associated to bioremediation demonstrated to be the best remotion system from contaminated water bodies. Recovery of the polluted soil and water remediation can be done through the Fenton reaction.

6.4. Reference to other sections

Refer to sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Use grounded electrical/mechanical equipment. Provide earthing of containers, equipment, pumps and ventilation facilities. Ground/bond container and receiving equipment. Avoid producing mist or vapours by heating of opened receptacle/container.

Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Use good personal hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Use explosion-proof equipment. Ensure adequate ventilation. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ground/bond container and receiving equipment.

Storage conditions : Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep in original containers closed. Keep stored the least quantity possible. Store in dry, cool, well-ventilated area.

Incompatible materials : Oxidizing agents. Strong acid. Halogenated compounds.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

o-xylene (95-47-6)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	o-Xylene
IOEL TWA	221 mg/m³
IOEL TWA [ppm]	50 ppm
IOEL STEL	442 mg/m³
IOEL STEL [ppm]	100 ppm
Remark	Skin
Regulatory reference	COMMISSION DIRECTIVE 2000/39/EC
Austria - Occupational Exposure Limits	
Local name	Xylol (alle Isomeren): o-Xylol
MAK (OEL TWA)	221 mg/m³
MAK (OEL TWA) [ppm]	50 ppm
MAK (OEL STEL)	442 mg/m³ (4x 15(Miw) min)
MAK (OEL STEL) [ppm]	100 ppm (4x 15(Miw) min)
Regulatory reference	BGBl. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	o-Xylène # o-Xyleen
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm

o-xylene (95-47-6)	
Remark	D: la mention “D” signifie que la résorption de l’agent, via la peau, les muqueuses ou les yeux, constitue une partie importante de l’exposition totale. Cette résorption peut se faire tant par contact direct que par présence de l’agent dans l’air. # D: de vermelding “D” betekent dat de opname van het agens via de huid, de slijmvliezen of de ogen een belangrijk deel van de totale blootstelling vormt. Deze opname kan het gevolg zijn van zowel direct contact als zijn aanwezigheid in de lucht.
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	о-Ксилен
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Кожа (възможна е значителна резорбция чрез кожата); • (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	o-Ksilen
GVI (OEL TWA) [1]	221 mg/m³
GVI (OEL TWA) [2]	50 ppm
KGVI (OEL STEL)	442 mg/m³
KGVI (OEL STEL) [ppm]	100 ppm
Remark	Direktiva: 2000/39/EZ
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Cyprus - Occupational Exposure Limits	
Local name	ο-ξυλένιο
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	δέρμα
Regulatory reference	Κανονισμοί του 2007 (Κ.Δ.Π. 295/2007)
Czech Republic - Occupational Exposure Limits	
Local name	Xylen isomery: o-Xylen
PEL (OEL TWA)	200 mg/m³
PEL (OEL TWA) [ppm]	45 ppm
NPK-P (OEL C)	400 mg/m³
NPK-P (OEL C) [ppm]	90 ppm

o-xylene (95-47-6)	
Remark	B - u látky je zaveden biologický expoziční test (BET) v moči nebo krvi, D - při expozici se významně uplatňuje pronikání faktoru kůží, I - dráždí sliznice (oči, dýchací cesty), respektive kůži.
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Czech Republic - Biological limit values	
Local name	Xyleny
BLV	1400 mg/g creatinine Ukazatel: Methylhippurová kyselina - Biologicky vzorek: moči - Doba odběru: konec směny 820 µmol/mmol Creatinine Ukazatel: Methylhippurová kyselina - Biologicky vzorek: moči - Doba odběru: konec směny
Regulatory reference	Vyhláška č. 107/2013 Sb. (kterou se mění vyhláška č. 432/2003 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Xylen (Dimethylbenzen), alle isomere: o-Xylen
OEL TWA [1]	109 mg/m³
OEL TWA [2]	25 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi); H (betyder, at stoffet kan optages gennem huden)
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	o-ksüleen
OEL TWA	200 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	450 mg/m³
OEL STEL [ppm]	100 ppm
Remark	A (Naha kaudu kergesti imenduv aine)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	o-Ksyleeni
HTP (OEL TWA) [1]	220 mg/m³
HTP (OEL TWA) [2]	50 ppm
HTP (OEL STEL)	440 mg/m³
HTP (OEL STEL) [ppm]	100 ppm
Remark	Iho
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	o-Xylène
VME (OEL TWA)	221 mg/m³
VME (OEL TWA) [ppm]	50 ppm
VLE (OEL C/STEL)	442 mg/m³

o-xylene (95-47-6)	
VLE (OEL C/STEL) [ppm]	100 ppm
Remark	Valeurs règlementaires contraignantes; risque de pénétration percutanée
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 984, 2016; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Xylol (alle Isomere)
AGW (OEL TWA) [1]	220 mg/m³
AGW (OEL TWA) [2]	50 ppm
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); H - hautresorptiv
Chemical category	Skin notation
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
Local name	o-Xylene
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Skin
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)
Greece - Occupational Exposure Limits	
Local name	Ξυλόλια (όλα τα ισομερή)
OEL TWA	435 mg/m³
OEL TWA [ppm]	100 ppm
OEL STEL	650 mg/m³
OEL STEL [ppm]	150 ppm
Remark	Η ένδειξη «δέρμα» στις οριακές τιμές επαγγελματικής έκθεσης επισημαίνει το ενδεχόμενο σημαντικής διείσδυσης μέσω του δέρματος.
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	o-XILOL
AK (OEL TWA)	221 mg/m³
CK (OEL STEL)	442 mg/m³
Remark	b (Bőrön át is felszívódik), BEM (biológiai expozíciós mutató); EU1 (2000/39/EK irányelvben közölt érték); R (Azok az anyagok, amelyek egészségkárosító hatása RÖVID expozíció hatására jelentkezik)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről

o-xylene (95-47-6)	
Ireland - Occupational Exposure Limits	
Local name	Xylene, o-isomer
OEL TWA [1]	221 mg/m³
OEL TWA [2]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Sk (Substances which have the capacity to penetrate intact skin when they come in contact with it, and be absorbed into the body), IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Italy - Occupational Exposure Limits	
Local name	o-Xilene
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Cute
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	o-Ksilols, (1,2-dimetilbenzols)
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Āda
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325
Lithuania - Occupational Exposure Limits	
Local name	o-ksilenas
IPRV (OEL TWA)	221 mg/m³
IPRV (OEL TWA) [ppm]	50 ppm
TPRV (OEL STEL)	442 mg/m³
TPRV (OEL STEL) [ppm]	100 ppm
Remark	O (medžiaga į organizmą gali prasiskverbti pro nepažeistą odą)
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	o-Xylène
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm

o-xylene (95-47-6)	
Remark	Peau
Regulatory reference	Mémorial A Nº 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	o-Xylene
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	Skin # Ġilda
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)
Poland - Occupational Exposure Limits	
Local name	Ksylen mieszanina izomerów: 1,2
NDS (OEL TWA)	100 mg/m³
NDSCh (OEL STEL)	200 mg/m³
Remark	Skóra (Oznakowanie substancji notacją „skóra” oznacza, że wchłanianie substancji przez skórę może być tak samo istotne jak przy narażeniu drogą oddechową).
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Xileno (o)
OEL TWA [ppm]	100 ppm
OEL STEL [ppm]	150 ppm
Remark	A4 (Agente não classificável como carcinogénico no Homem); IBE (Índice biológico de exposição)
Regulatory reference	Norma Portuguesa NP 1796:2014
Portugal - Biological Exposure Indices	
Local name	Xilenos (graus técnico e comercial)
BEI	1.5 g/g creatinine Parâmetro: Ácidos (o, m, p)-metilhipúricos - Meio: urina - Momento da amostragem: Fim do turno
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	o-xilen
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	P - posibilitatea unei penetrări cutanate importante
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Slovakia - Occupational Exposure Limits	
Local name	o-Xylén

o-xylene (95-47-6)	
NPHV (OEL TWA) [1]	221 mg/m³
NPHV (OEL TWA) [2]	50 ppm
NPHV (OEL STEL)	442 mg/m³
NPHV (OEL STEL) [ppm]	100 ppm
Remark	K - znamená, že faktor môže byť ľahko absorbovaný kožou
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	o-ksilen
OEL TWA	221 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	442 mg/m³
OEL STEL [ppm]	100 ppm
Remark	K (Lastnost lažjega prehajanja snovi v organizem skozi kožo), BAT (Biološka mejna vrednost), EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	o-Xileno
VLA-ED (OEL TWA) [1]	221 mg/m³
VLA-ED (OEL TWA) [2]	50 ppm
VLA-EC (OEL STEL)	442 mg/m³
VLA-EC (OEL STEL) [ppm]	100 ppm
Remark	Vía dérmica (Indica que, en las exposiciones a esta sustancia, la aportación por la vía cutánea puede resultar significativa para el contenido corporal total si no se adoptan medidas para prevenir la absorción. En estas situaciones, es aconsejable la utilización del control biológico para poder cuantificar la cantidad global absorbida del contaminante), VLB® (Agente químico que tiene Valor Límite Biológico), VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
Sweden - Occupational Exposure Limits	
Local name	o-Xylen
NGV (OEL TWA)	221 mg/m³
NGV (OEL TWA) [ppm]	50 ppm
KTV (OEL STEL)	442 mg/m³
KTV (OEL STEL) [ppm]	100 ppm
Remark	H (Ämnet kan lätt upptas genom huden. Det föreskrivna gränsvärdet bedöms ge tillräckligt skydd endast under förutsättning att huden är skyddad mot exponering för ämnet ifråga)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
Norway - Occupational Exposure Limits	
Local name	o-xylen
Grenseverdi (OEL TWA) [1]	108 mg/m³
Grenseverdi (OEL TWA) [2]	25 ppm

o-xylene (95-47-6)	
Remark	H: Kjemikalier som kan tas opp gjennom huden; E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet.
Regulatory reference	FOR-2021-06-28-2248
USA - ACGIH - Occupational Exposure Limits	
Local name	o-Xylene (1,2-Dimethylbenzene)
ACGIH OEL TWA [ppm]	20 ppm
Remark (ACGIH)	TLV® Basis: URT & eye irr; hematologic eff; CNS impair. Notations: A4 (Not classifiable as a Human Carcinogen); BEI
Regulatory reference	ACGIH 2022
USA - ACGIH - Biological Exposure Indices	
Local name	XYLENES (Technical or commercial grade)
BEI	1.5 g/g creatinine Parameter: Methylhippuric acids - Medium: urine - Sampling time: End of shift
Regulatory reference	ACGIH 2022

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

o-xylene (95-47-6)	
DNEL/DMEL (Workers)	
Acute - systemic effects, dermal	Low hazard
Acute - systemic effects, inhalation	442 mg/m³
Acute - local effects, dermal	Low hazard
Acute - local effects, inhalation	442 mg/m³
Long-term - systemic effects, dermal	212 mg/kg bodyweight/day
Long-term - local effects, dermal	No hazard identified
Long-term - systemic effects, inhalation	221 mg/m³
Long-term - local effects, inhalation	221 mg/m³
DNEL/DMEL (General population)	
Acute - systemic effects, dermal	Low hazard
Acute - systemic effects, inhalation	260 mg/m³
Acute - systemic effects, oral	No hazard identified
Acute - local effects, dermal	Low hazard
Acute - local effects, inhalation	260 mg/m³
Long-term - systemic effects,oral	2.5 mg/kg bodyweight/day
Long-term - systemic effects, inhalation	65.3 mg/m³
Long-term - systemic effects, dermal	125 mg/m³
Long-term - local effects, dermal	No hazard identified
Long-term - local effects, inhalation	65.3 mg/m³/day

o-xylene (95-47-6)	
PNEC (Water)	
PNEC aqua (freshwater)	0.044 mg/l
PNEC aqua (marine water)	0.0044 mg/l
PNEC aqua (intermittent, freshwater)	0.01 mg/l
PNEC aqua (intermittent, marine water)	0.001 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	2.52 mg/kg dwt
PNEC sediment (marine water)	0.252 mg/kg dwt
PNEC (Soil)	
PNEC soil	0.852 mg/kg dwt
PNEC (STP)	
PNEC sewage treatment plant	1.6 mg/l

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:
Provide local exhaust or general room ventilation to minimize vapour concentrations. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

8.2.2. Personal protection equipment

Personal protective equipment:
Protective clothing. Protective gloves. Self contained breathing apparatus.

8.2.2.1. Eye and face protection

Eye protection:
Chemical goggles or face shield with safety glasses. Use eye protection according to EN 166.

8.2.2.2. Skin protection

Skin and body protection:
Use protective coverall. Boots made of PVA

Hand protection:
Impermeable protective gloves. Do not reuse gloves. It is recommended that the glove supplier be consulted to ensure the protective gloves are resistant to chemicals in this product

Hand protection					
Type	**Material**	**Permeation**	**Thickness (mm)**	**Penetration**	**Standard**
Disposable gloves, E.g. KCL Type: 890 or equivalent	Viton	<480 minutes.	0.7	Not known	EN 374

8.2.2.3. Respiratory protection

Respiratory protection:
Approved organic vapour respirator. An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Consult a national health and safety authority for further guidance

Respiratory protection			
Device	**Filter type**	**Condition**	**Standard**
Full face mask, with cartridge/filter	A	Concentrations exceed max allowed workplace atmospheric concentrations.	EN 14387

8.2.2.4. Thermal hazards

No additional information available

8.2.3. Environmental exposure controls

Other information:
Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Colourless.
Molecular mass	:	106.16 g/mol
Odour	:	aromatic odour.
Odour threshold	:	Not available
Melting point	:	-25 °C
Freezing point	:	Not available
Boiling point	:	144 °C
Flammability	:	Not available
Explosive limits	:	Not available
Lower explosion limit	:	Not available
Upper explosion limit	:	Not available
Flash point	:	32 °C
Auto-ignition temperature	:	463 °C
Decomposition temperature	:	Not available
pH	:	Not applicable
Viscosity, kinematic	:	0.87 mm²/s
Solubility	:	Water: 170.5 mg/l
Partition coefficient n-octanol/water (Log Kow)	:	Not available
Partition coefficient n-octanol/water (Log Pow)	:	3.12 (at 20 °C (at pH 7)
Vapour pressure	:	8.82 hPa
Vapour pressure at 50°C	:	Not available
Density	:	Not available
Relative density	:	0.8755 g/cm³
Relative vapour density at 20°C	:	Not available
Particle characteristics	:	Not applicable

9.2. Other information

9.2.1. Information with regard to physical hazard classes

No additional information available

9.2.2. Other safety characteristics

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

No additional information available

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Avoid static electricity discharges.

10.5. Incompatible materials

Oxidizing agents. Strong acids. Halogenated compounds.

10.6. Hazardous decomposition products

Thermal decomposition may produce : Carbon oxides (CO, CO2). Formaldehyde.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity (oral) : Not classified (Based on available data, the classification criteria are not met)
Acute toxicity (dermal) : Harmful in contact with skin.
Acute toxicity (inhalation) : Harmful if inhaled.

o-xylene (95-47-6)	
LD50 oral rat	3608 mg/kg
LD50 dermal rabbit	12126 mg/kg
LC50 Inhalation - Rat	27124 mg/m³

Skin corrosion/irritation : Causes skin irritation.
Serious eye damage/irritation : Causes serious eye irritation.
Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity : Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity : Not classified (Based on available data, the classification criteria are not met)

o-xylene (95-47-6)	
IARC group	3 - Not classifiable

Reproductive toxicity : Not classified (Based on available data, the classification criteria are not met)
STOT-single exposure : May cause respiratory irritation.
STOT-repeated exposure : Not classified (Based on available data, the classification criteria are not met)

o-xylene (95-47-6)	
NOAEL (oral, rat, 90 days)	250 mg/kg bodyweight/day

Aspiration hazard : May be fatal if swallowed and enters airways.

o-xylene (95-47-6)	
Viscosity, kinematic	0.87 mm²/s

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties

Adverse health effects caused by endocrine disrupting properties : No additional information available

11.2.2. Other information

Other information : Likely routes of exposure: ingestion, inhalation, skin and eye

SECTION 12: Ecological information

12.1. Toxicity

Hazardous to the aquatic environment, short–term (acute) : Not classified (Based on available data, the classification criteria are not met)
Hazardous to the aquatic environment, long–term (chronic) : Harmful to aquatic life with long lasting effects.

o-xylene (95-47-6)	
LC50 - Fish [1]	11.6 – 22.4 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
LC50 - Fish [2]	11.6 – 22.4 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [flow-through])
EC50 - Crustacea [1]	3.2 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 - Crustacea [2]	2.61 – 5.59 mg/l (Exposure time: 48 h - Species: Daphnia magna [Flow through])
NOEC (acute)	1.17 mg/l (aquatic invertebrates - 7 d)
NOEC (chronic)	> 1.3 mg/l (56 d)

12.2. Persistence and degradability

o-xylene (95-47-6)	
Persistence and degradability	Readily biodegradable. not persistent.

o-xylene (95-47-6)	
BOD (% of ThOD)	50 % ThOD (23 d)

12.3. Bioaccumulative potential

o-xylene (95-47-6)	
BCF - Fish [1]	(21,4 dimensionless (xylene from crude oil)
Partition coefficient n-octanol/water (Log Pow)	3.12 (at 20 °C (at pH 7)
Bioaccumulative potential	not bioaccumulable.

12.4. Mobility in soil

No additional information available

12.5. Results of PBT and vPvB assessment

o-xylene (95-47-6)	
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII	
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII	
Results of PBT assessment	This substance does not meet the criteria for classification as PBT or vPvB.

12.6. Endocrine disrupting properties

Adverse effects on the environment caused by endocrine disrupting properties : No information available.

12.7. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste) : Dispose of contents/container to comply with applicable local, national and international regulations. Consult the appropriate authorities about waste disposal.

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.

Sewage disposal recommendations : The adequately treated and biorremediated effluents may be discarded into the water bodies.

Product/Packaging disposal recommendations : Dispose of this material and its container at hazardous or special waste collection point.

Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

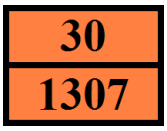
ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 1307	UN 1307	UN 1307	Not applicable	UN 1307
14.2. UN proper shipping name				
XYLENES	XYLENES	Xylenes	Not applicable	Not applicable
Transport document description				
UN 1307 XYLENES, 3, III, (D/E)	UN 1307 XYLENES, 3, III (23°C c.c.)	UN 1307 Xylenes, 3, III	Not applicable	UN 1307 , 3
14.3. Transport hazard class(es)				
3	3	3	Not applicable	3
			Not applicable	
14.4. Packing group				
III	III	III	Not applicable	Not applicable

ADR	IMDG	IATA	ADN	RID
14.5. Environmental hazards				
Dangerous for the environment: No	Dangerous for the environment: No Marine pollutant: No	Dangerous for the environment: No	Dangerous for the environment: No	Dangerous for the environment: No
No supplementary information available				

14.6. Special precautions for user

Overland transport

Classification code (ADR) : F1
Excepted quantities (ADR) : E1
Hazard identification number (Kemler No.) : 30
Orange plates :



Tunnel restriction code (ADR) : D/E

Transport by sea

Special provisions (IMDG) : 223
Limited quantities (IMDG) : 5 L
Excepted quantities (IMDG) : E1
Packing instructions (IMDG) : P001, LP01
IBC packing instructions (IMDG) : IBC03
Tank instructions (IMDG) : T2
Tank special provisions (IMDG) : TP1
EmS-No. (Fire) : F-E
EmS-No. (Spillage) : S-D
Stowage category (IMDG) : A
Flash point (IMDG) : 23°C to 30°C c.c.
Properties and observations (IMDG) : Colourless liquids. Flashpoint: 23°C to 30°C c.c. Explosive limits: 1.1% to 7% Immiscible with water.

Air transport

PCA Excepted quantities (IATA) : E1
PCA Limited quantities (IATA) : Y344
PCA limited quantity max net quantity (IATA) : 10L
PCA packing instructions (IATA) : 355
PCA max net quantity (IATA) : 60L
CAO packing instructions (IATA) : 366
CAO max net quantity (IATA) : 220L
Special provisions (IATA) : A3
ERG code (IATA) : 3L

Inland waterway transport

No data available

Rail transport

No data available

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

15.1.1. EU-Regulations

REACH Annex XVII (Restriction List)

Not listed on REACH Annex XVII

REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Not listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (1005/2009)

Not listed on the Ozone Depletion list (Regulation EU 1005/2009)

Explosives Precursors Regulation (2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

15.1.2. National regulations

Listed on the United States TSCA (Toxic Substances Control Act) inventory - Status: Active
Listed on the Canadian DSL (Domestic Substances List)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)
Subject to reporting requirements of United States SARA Section 313
Listed on EPA Hazardous Air Pollutant (HAPS)
Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Japanese ENCS (Existing New Chemical Substances) inventory
Listed on KECL/KECI (Korean Existing Chemicals Inventory)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Japanese Poisonous and Deleterious Substances Control Law
Japanese Pollutant Release and Transfer Register Law (PRTR Law)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on the TCSI (Taiwan Chemical Substance Inventory)
Listed on the NCI (Vietnam - National Chemical Inventory)

France

Occupational diseases	
Code	Description
RG 84	Conditions caused by liquid organic solvents for professional use: saturated or unsaturated aliphatic or cyclic liquid hydrocarbons and mixtures thereof; liquid halogenated hydrocarbons; nitrated derivatives of aliphatic hydrocarbons; alcohols; glycols, glycol ethers; ketones; aldehydes; aliphatic and cyclic ethers, including tetrahydrofuran; esters; dimethylformamide and dimethylacetamine; acetonitrile and propionitrile; pyridine; dimethylsulfone and dimethylsulfoxide

Germany

Water hazard class (WGK)	:	WGK 2, Significantly hazardous to water (Classification according to VwVwS, Annex 1 or 2; ID No. 206).
WGK remark	:	Most stringent classification due to insufficient data.
Hazardous Incident Ordinance (12. BImSchV)	:	Is not subject of the Hazardous Incident Ordinance (12. BImSchV)

Netherlands

SZW-lijst van kankerverwekkende stoffen	:	The substance is not listed
SZW-lijst van mutagene stoffen	:	The substance is not listed
SZW-lijst van reprotoxische stoffen – Borstvoeding	:	The substance is not listed

SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : The substance is not listed
SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Class for fire hazard : Class II-1
Store unit : 5 liter
Classification remarks : R10 <H226;H304;H312+H332;H315;H319;H335;H412>; Emergency management guidelines for the storage of flammable liquids must be followed
Danish National Regulations : Young people under 18 years are not allowed to use the product
Pregnant/breastfeeding women working with the product must not be in direct contact with it

15.2. Chemical safety assessment

CSA has been established. Exposure scenario is attached.

SECTION 16: Other information

Indication of changes

Section	Changed item	Change	Comments
8	Exposure controls / Personal protection equipment	Modified	
8.1.4	DNEL/DMEL	Modified	

Abbreviations and acronyms:	
ACGIH	ACGIH (American Conference of Governement Industrial Hygienists)
ASTM	ASTM - American Society for Testing and Materials
CAS	CAS (Chemical Abstracts Service) number
CLP	CLP - Classification, Labelling and Packaging
EEC	EEC - European Economic Community
EC	EC - European Community
CSR	CSR - Chemical Safety Report
GHS	GHS - Globally Harmonised System
IARC	IARC (International Agency for Research on Cancer)
ADR	Overland transport (ADR)
PVC	PVC (Polyvinyl chloride).
REACH	REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals
SDS	SDS - Safety Data Sheet

Sources of Key data : MSDS.

Full text of H- and EUH-statements:	
Acute Tox. 4 (Dermal)	Acute toxicity (dermal), Category 4
Acute Tox. 4 (Inhalation)	Acute toxicity (inhal.), Category 4
Aquatic Chronic 3	Hazardous to the aquatic environment – Chronic Hazard, Category 3
Asp. Tox. 1	Aspiration hazard, Category 1
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2
Flam. Liq. 3	Flammable liquids, Category 3
H226	Flammable liquid and vapour.
H304	May be fatal if swallowed and enters airways.

Full text of H- and EUH-statements:	
H312	Harmful in contact with skin.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H412	Harmful to aquatic life with long lasting effects.
Skin Irrit. 2	Skin corrosion/irritation, Category 2
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Respiratory tract irritation

Full text of use descriptors	
ERC2	Formulation into mixture
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC6a	Use of intermediate
ERC8a	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)
ESVOC SPERC 2.2.v1	Formulation & packing of preparations and mixtures: Industrial (SU10)
ESVOC SPERC 8.3c.v1	Uses in Coatings: Consumer (SU21)
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC10	Roller application or brushing
PROC11	Non industrial spraying
PROC13	Treatment of articles by dipping and pouring
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC15	Use as laboratory reagent
PROC19	Manual activities involving hand contact
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC28	Manual maintenance (cleaning and repair) of machinery
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC7	Industrial spraying
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Annex to the safety data sheet

Product exposure scenario(s)	
ES Type	**ES title**
Worker	Formulation or re-packing
Worker	Use at industrial sites. Use as an intermediate
Worker	Use at industrial sites. Uses in coatings

1. Exposure scenario ES2

Formulation or re-packing	ES Ref.: ES2 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15, PROC28 ERC2

2. Operational conditions and risk management measures

2.2. Contributing scenario controlling environmental exposure (ERC2)

Formulation	
ERC2	Formulation into mixture

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	98 %
Vapour pressure	1.052 kPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Amounts used	Maximum daily use at site	≤ 5 t/d
	Annual site tonnage	≤ 1500 t/yr
Frequency and duration of use	Emission days	300 days/yr
Other given operational conditions affecting environmental exposure	Equipment cleaning and maintenance	No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
	Indoor or outdoor use	Indoor use

Risk Management Measures		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Process efficiency:	Process optimized for efficient use of raw materials
	On-site treatment of off-air:	Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
Conditions and measures related to sewage treatment plant	Required Removal Efficiency (wastewater):	93.35 %
	Discharge rate of Municipal STP	2000 m³/d
	Application of the STP sludge on agricultural soil:	Yes.

2.1.1. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed system (minimal contact during routine operations)	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Not required
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Chemical resistant gloves (according to European standard NF EN 374 or equivalent)
	Respiratory protection:	No
	Eye protection:	Yes

2.1.2. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Exposure duration	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed system (minimal contact during routine operations)	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Chemical resistant gloves (according to European standard NF EN 374 or equivalent)
	Respiratory protection:	No
	Eye protection:	Yes.

2.1.3. Contributing scenario controlling worker exposure (PROC2)

General exposures (closed systems), Use in contained systems, with sample collection	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Yes
	Respiratory protection:	No
	Eye protection:	Yes

2.1.4. Contributing scenario controlling worker exposure (PROC3)

General exposures (closed systems)	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day

Operational conditions		
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed, continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.5. Contributing scenario controlling worker exposure (PROC4)

General exposures (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	No
	Eye protection:	Yes

2.1.6. Contributing scenario controlling worker exposure (PROC4)

General exposures (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	98 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	No
	Eye / face protection	Yes

2.1.7. Contributing scenario controlling worker exposure (PROC3)

Batch processes at elevated temperatures. Use in contained batch processes	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed, continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374

Risk Management Measures		
	Respiratory protection:	Not required
	Eye protection:	Yes.

2.1.8. Contributing scenario controlling worker exposure (PROC3)

Batch processes at elevated temperatures. Use in contained batch processes	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed, continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.9. Contributing scenario controlling worker exposure (PROC9)

Process sampling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.10. Contributing scenario controlling worker exposure (PROC15)

Laboratory activities	
PROC15	Use as laboratory reagent

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. 3 ACH
	Handle in a fume cupboard or under extract ventilation.	90 % Inhalation. effectiveness
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes.

2.1.11. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2

Operational conditions		
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.12. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.13. Contributing scenario controlling worker exposure (PROC5)

Mixing operations (open systems)	
PROC5	Mixing or blending in batch processes

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. (480 cm2)
Other given operational conditions affecting workers exposure	indoor	
	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Not required
	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Eye protection:	Yes

2.1.14. Contributing scenario controlling worker exposure (PROC8a)

Transfer from/pouring from containers. Non-dedicated facility	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product characteristics	
Concentration of substance in product	100

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Not required
	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Eye protection:	Yes.

2.1.15. Contributing scenario controlling worker exposure (PROC8b)

Drum/batch transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.16. Contributing scenario controlling worker exposure (PROC8b)

Drum/batch transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.17. Contributing scenario controlling worker exposure (PROC14)

Production of preparations or articles by tabletting, compression, extrusion, pelettisation	
PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.18. Contributing scenario controlling worker exposure (PROC9)

Drum and small package filling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.19. Contributing scenario controlling worker exposure (PROC9)

Drum and small package filling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.20. Contributing scenario controlling worker exposure (PROC8a, PROC28)

Equipment cleaning and maintenance	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
	Operating temperature	≤ 20 °C

Operational conditions		
Other given operational conditions affecting workers exposure	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	Yes. LEV has been added to equate to the SOP. Drain down and flush system prior to equipment break-in or maintenance
	Occupational Health and Safety Management System:	Advanced
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemical resistant dermal protection with basic employee training.
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.21. Contributing scenario controlling worker exposure (PROC1, PROC2)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.22. Contributing scenario controlling worker exposure (PROC1, PROC2)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. (480 cm2)
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects						
DNEL			Inhalation: 221 mg/m³ Dermal: 212 mg/kg bodyweight/day			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.044 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC1	0.031 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC2	22.11 mg/m³	0.1	0.274 mg/kg bw/day	< 0.01	< 0.11	
PROC3	44.23 mg/m³	0.2	0.138 mg/kg bw/day	< 0.01	< 0.21	
PROC4	88.47 mg/m³	0.4	1.372 mg/kg bw/day	< 0.01	< 0.41	

Long-term - systemic effects						
PROC4	53.08 mg/m³	0.24	0.823 mg/kg bw/day	< 0.01	< 0.25	
PROC3	44.23 mg/m³	0.2	0.138 mg/kg bw/day	< 0.01	< 0.21	
PROC3	26.54 mg/m³	0.12	0.083 mg/kg bw/day	< 0.01	< 0.13	
PROC9	39.81 mg/m³	0.18	0.823 mg/kg bw/day	< 0.01	< 0.19	
PROC15	44.23 mg/m³	0.2	0.068 mg/kg bw/day	< 0.01	< 0.21	
PROC8b	77.41 mg/m³	0.35	2.742 mg/kg bw/day	0.013	0.363	
PROC8b	46.44 mg/m³	0.21	1.645 mg/kg bw/day	< 0.01	< 0.22	
PROC5	66.35 mg/m³	0.3	2.742 mg/kg bw/day	0.013	0.313	
PROC8a	39.81 mg/m³	0.18	1.645 mg/kg bw/day	< 0.01	< 0.19	
PROC8b	77.41 mg/m³	0.35	2.742 mg/kg bw/day	0.013	0.363	
PROC8b	46.44 mg/m³	0.21	1.645 mg/kg bw/day	< 0.01	< 0.22	
PROC14	13.27 mg/m³	0.06	0.412 mg/kg bw/day	< 0.01	< 0.07	
PROC9	66.35 mg/m³	0.3	1.372 mg/kg bw/day	< 0.01	< 0.31	
PROC9	13.27 mg/m³	0.06	0.823 mg/kg bw/day	< 0.01	< 0.07	
PROC8a, PROC28	22.11 mg/m³	0.1	1.371 mg/kg bw/day	< 0.01	< 0.11	
PROC1, PROC2	0.031 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC1, PROC2	22.11 mg/m³	0.1	0.274 mg/kg bw/day	< 0.01	< 0.11	

Acute - systemic effects						
DNEL			Inhalation: 442 mg/m³ Dermal:			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.177 mg/m³	< 0.01			< 0.01	
PROC1	0.124 mg/m³	< 0.01			< 0.01	
PROC2	88.47 mg/m³	0.2			0.2	
PROC3	176.9 mg/m³	0.4			0.4	
PROC4	353.9 mg/m³	0.801			0.801	
PROC4	353.9 mg/m³	0.801			0.801	

Acute - systemic effects						
PROC3	176.9 mg/m³	0.4			0.4	
PROC3	176.9 mg/m³	0.4			0.4	
PROC9	265.4 mg/m³	0.601			0.601	
PROC15	176.9 mg/m³	0.4			0.4	
PROC8b	309.6 mg/m³	0.701			0.701	
PROC8b	309.6 mg/m³	0.701			0.701	
PROC5	265.4 mg/m³	0.601			0.601	
PROC8a	265.4 mg/m³	0.601			0.601	
PROC8b	309.6 mg/m³	0.701			0.701	
PROC8b	309.6 mg/m³	0.701			0.701	
PROC14	88.47 mg/m³	0.2			0.2	
PROC9	265.4 mg/m³	0.601			0.601	
PROC9	88.47 mg/m³	0.2			0.2	
PROC8a, PROC28	88.47 mg/m³	0.2			0.2	
PROC1, PROC2	0.124 mg/m³	< 0.01			< 0.01	
PROC1, PROC2	88.47 mg/m³	0.2			0.2	

Local - Inhalation					
DNEL			Acute: 442 mg/m³ Long-term: 221 mg/m³		
Contributing scenario	Acute	RCR	Long term	RCR	Assessment method
PROC1 X	0.177 mg/m³	< 0.01	0.044 mg/m³	< 0.01	
PROC1 X	0.124 mg/m³	< 0.01	0.031 mg/m³/day	< 0.01	
PROC2 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC3 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	
PROC4 X	353.9 mg/m³	0.801	88.47 mg/m³	0.4	
PROC4 X	353.9 mg/m³	0.801	53.08 mg/m³	0.24	
PROC3 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	
PROC3 X	176.9 mg/m³	0.4	26.54 mg/m³	0.12	
PROC9 X	265.4 mg/m³	0.601	39.81 mg/m³	0.18	
PROC15 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	

Local - Inhalation					
PROC8b X	309.6 mg/m³	0.701	77.41 mg/m³	0.35	
PROC8b X	309.6 mg/m³	0.701	46.44 mg/m³	0.21	
PROC5 X	265.4 mg/m³	0.601	66.35 mg/m³	0.3	
PROC8a X	265.4 mg/m³	0.601	39.81 mg/m³	0.18	
PROC8b X	309.6 mg/m³	0.701	77.41 mg/m³	0.35	
PROC8b X	309.6 mg/m³	0.701	46.44 mg/m³	0.21	
PROC14 X	88.47 mg/m³	0.2	13.27 mg/m³	0.06	
PROC9 X	265.4 mg/m³	0.601	66.35 mg/m³	0.3	
PROC9 X	88.47 mg/m³	0.2	13.27 mg/m³	0.06	
PROC8a, PROC28 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC1, PROC2 X	0.124 mg/m³	< 0.01	0.031 mg/m³	< 0.01	
PROC1, PROC2 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	

3.2. Environment

Environmental exposure	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.033	0.044	0.75	EUSES 2.1.2
Marine water	mg/l	0.00334	0.0044	0.759	EUSES 2.1.2
Freshwater sediment	mg/kg dwt	1.914	2.52	0.76	EUSES 2.1.2
Marine water sediment	mg/kg dwt	0.191	0.252	0.758	EUSES 2.1.2
Sewage treatment plant	mg/l	0.333	1.6	0.208	EUSES 2.1.2
Soil	mg/kg dwt	0.543	0.852	0.637	EUSES 2.1.2

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Wear suitable gloves tested to EN374

4.2. Environment

Guidance - Environment	Common practices vary across sites thus conservative process release estimates used. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

Additional good practice beyond the REACH CSA	
Additional good practice advice	Wear suitable gloves (tested to EN374) and eye protection

1. Exposure scenario ES3

Use at industrial sites. **Use as an intermediate**	ES Ref.: ES3 ES Type: Worker

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC28 ERC6a

2. Operational conditions and risk management measures

2.2. Contributing scenario controlling environmental exposure (ERC6a)

Use of intermediate	
ERC6a	Use of intermediate

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	98 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Amounts used	Maximum daily use at site	≤ 334 t/d
	Annual site tonnage	100000 t/yr
	Msperc	50 t/d
Frequency and duration of use	Emission days	300 days/yr
Other given operational conditions affecting environmental exposure	Equipment cleaning and maintenance	No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
	Indoor or outdoor use	Indoor use

Risk Management Measures		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Process efficiency:	Process optimized for efficient use of raw materials
	On-site treatment of off-air:	On-site treatment of off-air: Upgrade of the system in place or additional air treatment measures (Upgrade of the system in place or additional air treatment measures, such as wet scrubber and/or air filtration and/or thermal oxidation and/or vapour recovery systems, in order to achieve a reduction of the air emissions.) [Effectiveness Air: 50%]
	On-site waste water treatment	Acclimated biological treatment [Effectiveness Water: 70%]
Conditions and measures related to sewage treatment plant	Required Removal Efficiency (wastewater):	93.35 %
	Discharge rate of Municipal STP	2000 m³/d

Risk Management Measures		
	Application of the STP sludge on agricultural soil:	Yes.
Conditions and measures related to external treatment of waste for disposal	Particular considerations on the waste treatment operations:	No (low risk)

2.1.1. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.2. Contributing scenario controlling worker exposure (PROC2)

General exposures (closed systems)	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day

Operational conditions		
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.3. Contributing scenario controlling worker exposure (PROC3)

General exposures (closed systems)	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed batch process . With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.4. Contributing scenario controlling worker exposure (PROC4)

General exposures (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.5. Contributing scenario controlling worker exposure (PROC4)

General exposures (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.6. Contributing scenario controlling worker exposure (PROC4)

General exposures (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.7. Contributing scenario controlling worker exposure (PROC9)

Process sampling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Ensure samples are obtained under containment or extract ventilation. or. Sample via a closed loop or other system to avoid exposure
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.8. Contributing scenario controlling worker exposure (PROC9)

Process sampling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Yes. APF ≥ 10

Risk Management Measures		
	Eye protection:	Yes

2.1.9. Contributing scenario controlling worker exposure (PROC9)

Process sampling	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.10. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.11. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers. (open systems)	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Ensure material transfers are under containment or extract ventilation.
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.12. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers. (open systems)	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid

Product characteristics	
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.13. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers. (open systems)	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required

Risk Management Measures		
	Eye protection:	Yes

2.1.14. Contributing scenario controlling worker exposure (PROC8b)

Bulk transfers.(closed systems)	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.15. Contributing scenario controlling worker exposure (PROC8a, PROC28)

Equipment cleaning and maintenance	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
	Operating temperature	≤ 20 °C

Operational conditions		
Other given operational conditions affecting workers exposure	Indoor use	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.16. Contributing scenario controlling worker exposure (PROC1, PROC2)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	Store substance within a closed system
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.17. Contributing scenario controlling worker exposure (PROC1, PROC2)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	Store substance within a closed system
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects						
DNEL			Inhalation: 221 mg/m³ Dermal: 212 mg/kg bodyweight/day			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.031 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC2	22.11 mg/m³	0.1	0.274 mg/kg bw/day	< 0.01	< 0.11	
PROC3	44.23 mg/m³	0.2	0.138 mg/kg bw/day	< 0.01	< 0.21	
PROC4	61.93 mg/m³	0.28	1.372 mg/kg bw/day	< 0.01	< 0.29	

Long-term - systemic effects						
PROC4	37.15 mg/m³	0.168	0.823 mg/kg bw/day	< 0.01	< 0.178	
PROC4	37.15 mg/m³	0.168	0.823 mg/kg bw/day	< 0.01	< 0.178	
PROC9	22.11 mg/m³	0.1	1.372 mg/kg bw/day	< 0.01	< 0.11	
PROC9	13.27 mg/m³	0.06	0.823 mg/kg bw/day	< 0.01	< 0.07	
PROC9	9.29 mg/m³	0.042	0.823 mg/kg bw/day	< 0.01	< 0.052	
PROC1	0.044 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC8b	5.53 mg/m³	0.025	2.742 mg/kg bw/day	0.013	0.038	
PROC8b	77.41 mg/m³	0.35	2.742 mg/kg bw/day	0.013	0.363	
PROC8b	46.44 mg/m³	0.21	1.645 mg/kg bw/day	< 0.01	< 0.22	
PROC8b	77.41 mg/m³	0.35	2.742 mg/kg bw/day	0.013	0.363	
PROC8a, PROC28	39.81 mg/m³	0.18	1.645 mg/kg bw/day	< 0.01	< 0.19	
PROC1, PROC2	0.044 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC1, PROC2	15.48 mg/m³	0.07	0.274 mg/kg bw/day	< 0.01	< 0.08	

Acute - systemic effects						
DNEL			Inhalation: 442 mg/m³ Dermal:			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.124 mg/m³	< 0.01			< 0.01	
PROC2	88.47 mg/m³	0.2			0.2	
PROC3	176.9 mg/m³	0.4			0.4	
PROC4	247.7 mg/m³	0.56			0.56	
PROC4	247.7 mg/m³	0.56			0.56	
PROC4	247.7 mg/m³	0.56			0.56	
PROC9	88.47 mg/m³	0.2			0.2	
PROC9	88.47 mg/m³	0.2			0.2	
PROC9	61.93 mg/m³	0.14			0.14	
PROC1	0.177 mg/m³	< 0.01			< 0.01	
PROC8b	22.11 mg/m³	0.05			0.05	
PROC8b	309.6 mg/m³	0.701			0.701	

Acute - systemic effects						
PROC8b	309.6 mg/m³	0.7			0.7	
PROC8b	309.6 mg/m³	0.7			0.7	
PROC8a, PROC28	265.4 mg/m³	0.6			0.6	
PROC1, PROC2	0.177 mg/m³	< 0.01			< 0.01	
PROC1, PROC2	61.93 mg/m³	0.14			0.14	

Local - Inhalation					
DNEL			Acute: 442 mg/m³ Long-term: 221 mg/m³		
Contributing scenario	Acute	RCR	Long term	RCR	Assessment method
PROC1 X	0.124 mg/m³	< 0.01	0.031 mg/m³	< 0.01	
PROC2 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC3 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	
PROC4 X	247.7 mg/m³	0.56	61.93 mg/m³	0.28	
PROC4 X	247.7 mg/m³	0.56	37.15 mg/m³	0.168	
PROC4 X	247.7 mg/m³	0.56	37.15 mg/m³	0.168	
PROC9 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC9 X	88.47 mg/m³	0.2	13.27 mg/m³	0.06	
PROC9 X	61.93 mg/m³	0.14	9.29 mg/m³	0.042	
PROC1 X	0.177 mg/m³	< 0.01	0.044 mg/m³	< 0.01	
PROC8b X	22.11 mg/m³	0.05	5.53 mg/m³	0.025	
PROC8b X	309.6 mg/m³	0.701	77.41 mg/m³	0.35	
PROC8b X	309.6 mg/m³	0.7	46.44 mg/m³	0.21	
PROC8b X	309.6 mg/m³	0.7	77.41 mg/m³	0.35	
PROC8a, PROC28 X	265.4 mg/m³	0.6	39.81 mg/m³	0.18	
PROC1, PROC2 X	0.177 mg/m³	< 0.01	0.044 mg/m³	< 0.01	
PROC1, PROC2 X	61.93 mg/m³	0.14	15.48 mg/m³	0.07	

3.2. Environment

Environmental exposure	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.00851	0.044	0.193	EUSES 2.1.2
Marine water	mg/l	0.00334	0.0044	0.76	EUSES 2.1.2
Freshwater sediment	mg/kg dwt	0.487	2.52	0.193	EUSES 2.1.2
Marine water sediment	mg/kg dwt	0.192	0.252	0.76	EUSES 2.1.2
Sewage treatment plant	mg/l	0.333	1.6	0.208	EUSES 2.1.2
Soil	mg/kg dwt	0.561	0.852	0.658	EUSES 2.1.2

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Wear suitable gloves tested to EN374.

4.2. Environment

Guidance - Environment	Common practices vary across sites thus conservative process release estimates used. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

Additional good practice advice beyond the REACH CSA

Additional good practice advice	Wear suitable gloves (tested to EN374) and eye protection

1. Exposure scenario ES4

Use at industrial sites. Uses in coatings	ES Ref.: ES4 ES Type: Worker	

Use descriptors	PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC28 ERC4

2. Operational conditions and risk management measures

2.2. Contributing scenario controlling environmental exposure (ERC4)

Uses in Coatings	
ERC4	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	98 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Amounts used	Maximum daily use at site	≤ 5 t/d
	Annual site tonnage	1140 t/yr
	Msperc	50 t/d
Frequency and duration of use	Emission days	300
Other given operational conditions affecting environmental exposure	Equipment cleaning and maintenance	No release to wastewater from process as such, wastewater emissions limited to release generated from final equipment cleaning step using water
	Indoor or outdoor use	Indoor use

Risk Management Measures		
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	Process efficiency:	Process optimized for efficient use of raw materials
	On-site treatment of off-air:	Typical measures to maintain workplace concentrations or airborne VOCs and particulates below respective OELS
Conditions and measures related to sewage treatment plant	Required Removal Efficiency (wastewater):	93.35 %
	Discharge rate of Municipal STP	2000 m³/d
	Application of the STP sludge on agricultural soil:	Yes.
Conditions and measures related to external treatment of waste for disposal	Particular considerations on the waste treatment operations:	

2.1.1. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.2. Contributing scenario controlling worker exposure (PROC1)

General exposures (closed systems)	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
	Operating temperature	≤ 20 °C

Operational conditions		
Other given operational conditions affecting workers exposure	Outdoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.3. Contributing scenario controlling worker exposure (PROC2)

General exposures (closed systems). Use in contained systems. with sample collection	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.4. Contributing scenario controlling worker exposure (PROC2)

General exposures (closed systems). Use in contained systems. with sample collection	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor use	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.5. Contributing scenario controlling worker exposure (PROC2)

Film formation - force drying, stoving and other technologies. Use in contained systems. elevated temperature	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Closed continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.6. Contributing scenario controlling worker exposure (PROC4)

Film formation - air drying. (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.7. Contributing scenario controlling worker exposure (PROC4)

Film formation - air drying. (open systems)	
PROC4	Chemical production where opportunity for exposure arises

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Product characteristics	
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.8. Contributing scenario controlling worker exposure (PROC3)

Mixing operations (closed systems). Use in contained batch processes	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed batch process . With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified. Ensure material transfers are under containment or extract ventilation.

Risk Management Measures		
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.9. Contributing scenario controlling worker exposure (PROC5)

Preparation of material for application. Mixing operations (open systems)	
PROC5	Mixing or blending in batch processes

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Provide extract ventilation to points where emissions occur
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.10. Contributing scenario controlling worker exposure (PROC5)

Preparation of material for application. Mixing operations (open systems)	
PROC5	Mixing or blending in batch processes

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.11. Contributing scenario controlling worker exposure (PROC7)

Spraying (automatic/robotic)	
PROC7	Industrial spraying

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Two hands and upper wrists (1500 cm2)
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Carry out in a vented booth provided with laminar airflow
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.12. Contributing scenario controlling worker exposure (PROC7)

Spraying. Manual	
PROC7	Industrial spraying

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Two hands and upper wrists (1500 cm2)
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 95 % Chemical resistant dermal protection with specific employee training.
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.13. Contributing scenario controlling worker exposure (PROC8a)

Material transfers. Non-dedicated facility	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Provide extract ventilation to points where emissions occur
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.14. Contributing scenario controlling worker exposure (PROC8a)

Material transfers. Non-dedicated facility	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.15. Contributing scenario controlling worker exposure (PROC8b)

Material transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa

Product characteristics	
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Good general ventilation (3-5 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.16. Contributing scenario controlling worker exposure (PROC8b)

Material transfers. Dedicated facility	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.17. Contributing scenario controlling worker exposure (PROC10)

Roller, spreader, flow application	
PROC10	Roller application or brushing

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 95 % Chemical resistant dermal protection with specific employee training.
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.18. Contributing scenario controlling worker exposure (PROC10)

Roller, spreader, flow application	
PROC10	Roller application or brushing

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 95 % Chemical resistant dermal protection with specific employee training.
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.19. Contributing scenario controlling worker exposure (PROC13)

Dipping, immersion and pouring	
PROC13	Treatment of articles by dipping and pouring

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.20. Contributing scenario controlling worker exposure (PROC13)

Dipping, immersion and pouring	
PROC13	Treatment of articles by dipping and pouring

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %

Product characteristics	
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Yes. APF ≥ 10
	Eye protection:	Yes

2.1.21. Contributing scenario controlling worker exposure (PROC15)

Laboratory activities	
PROC15	Use as laboratory reagent

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure	90 % Inhalation
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374

Risk Management Measures		
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.22. Contributing scenario controlling worker exposure (PROC8a, PROC28)

Equipment cleaning and maintenance	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Both hands. 960 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemical resistant dermal protection with basic employee training.
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.23. Contributing scenario controlling worker exposure (PROC9)

Material transfers. Drum/batch transfers. Transfer from/pouring from containers. Dedicated facility	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Fill containers/cans at dedicated fill points supplied with local extract ventilation.
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.24. Contributing scenario controlling worker exposure (PROC9)

Material transfers. Drum/batch transfers. Transfer from/pouring from containers. Dedicated facility	
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.25. Contributing scenario controlling worker exposure (PROC14)

Production or preparations or articles by tabletting, compression, extrusion or pelletisation	
PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of both hands. 480 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	Yes. Provide extract ventilation to points where emissions occur
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.26. Contributing scenario controlling worker exposure (PROC1)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Indoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
	Local exhaust ventilation	No specific measures identified
	General ventilation	Basic. Up to 3 ACH
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

2.1.27. Contributing scenario controlling worker exposure (PROC1)

Storage	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	8.82 hPa
Viscosity, kinematic	1 mm²/s

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Human factors not influenced by risk management	Skin contact	Palm of one hand. 240 cm2
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
	Outdoor	

Risk Management Measures		
Technical conditions and measures at process level (source) to prevent release	Use in closed process, no likelihood of exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 80 % Wear suitable gloves tested to EN374
	Respiratory protection:	Not required
	Eye protection:	Yes

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects	
DNEL	Inhalation: 221 mg/m³ Dermal: 212 mg/kg bodyweight/day

Long-term - systemic effects						
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.044 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC1	0.031 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC2	22.11 mg/m³	0.1	0.274 mg/kg bw/day	0.001	0.101	
PROC2	15.48 mg/m³	0.07	0.274 mg/kg bw/day	0.001	0.071	
PROC2	22.11 mg/m³	0.1	0.274 mg/kg bw/day	0.001	0.101	
PROC4	88.47 mg/m³	0.4	1.372 mg/kg bw/day	< 0.01	< 0.41	
PROC4	53.08 mg/m³	0.24	0.823 mg/kg bw/day	0.004	0.244	
PROC3	44.23 mg/m³	0.2	0.138 mg/kg bw/day	0.001	0.201	
PROC5	22.11 mg/m³	0.1	2.742 mg/kg bw/day	0.013	0.113	
PROC5	39.81 mg/m³	0.18	1.645 mg/kg bw/day	0.008	0.188	
PROC7	38.7 mg/m³	0.175	8.572 mg/kg bw/day	0.04	0.215	
PROC7	19.9 mg/m³	0.09	1.286 mg/kg bw/day	0.006	0.096	
PROC8a	22.11 mg/m³	0.1	2.742 mg/kg bw/day	0.013	0.113	
PROC8a	13.27 mg/m³	0.06	1.645 mg/kg bw/day	0.008	0.068	
PROC8b	77.41 mg/m³	0.35	2.742 mg/kg bw/day	0.013	0.363	
PROC8b	46.44 mg/m³	0.21	1.645 mg/kg bw/day	0.008	0.218	
PROC10	66.35 mg/m³	0.3	1.372 mg/kg bw/day	< 0.01	< 0.31	
PROC10	13.27 mg/m³	0.06	0.823 mg/kg bw/day	0.004	0.064	
PROC13	66.35 mg/m³	0.3	2.742 mg/kg bw/day	0.013	0.313	
PROC13	9.29 mg/m³	0.042	1.645 mg/kg bw/day	0.008	0.05	
PROC15	44.23 mg/m³	0.2	0.068 mg/kg bw/day	0	0.2	
PROC8a, PROC28	66.35 mg/m³	0.3	1.371 mg/kg bw/day	< 0.01	< 0.31	
PROC9	22.11 mg/m³	0.1	1.372 mg/kg bw/day	< 0.01	< 0.11	

Long-term - systemic effects						
PROC9	39.81 mg/m³	0.18	0.823 mg/kg bw/day	0.004	0.184	
PROC14	22.11 mg/m³	0.1	0.686 mg/kg bw/day	0.003	0.103	
PROC1	0.044 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	
PROC1	0.031 mg/m³	< 0.01	0.0068 mg/kg bw/day	< 0.01	< 0.02	

Acute - systemic effects						
DNEL			Inhalation: 442 mg/m³ Dermal:			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1	0.177 mg/m³	< 0.01			< 0.01	
PROC1	0.124 mg/m³	< 0.01			< 0.01	
PROC2	88.47 mg/m³	0.2			0.2	
PROC2	61.93 mg/m³	0.14			0.14	
PROC2	88.47 mg/m³	0.2			0.2	
PROC4	353.9 mg/m³	0.801			0.801	
PROC4	353.9 mg/m³	0.801			0.801	
PROC3	176.9 mg/m³	0.4			0.4	
PROC5	88.47 mg/m³	0.2			0.2	
PROC5	265.4 mg/m³	0.6			0.6	
PROC7	154.8 mg/m³	0.35			0.35	
PROC7	132.7 mg/m³	0.3			0.3	
PROC8a	88.47 mg/m³	0.2			0.2	
PROC8a	88.47 mg/m³	0.2			0.2	
PROC8b	309.6 mg/m³	0.7			0.7	
PROC8b	309.6 mg/m³	0.7			0.7	
PROC10	265.4 mg/m³	0.6			0.6	
PROC10	88.47 mg/m³	0.2			0.2	
PROC13	265.4 mg/m³	0.6			0.6	
PROC13	61.93 mg/m³	0.14			0.14	
PROC15	176.9 mg/m³	0.4			0.4	
PROC8a, PROC28	265.4 mg/m³	0.6			0.6	
PROC9	88.47 mg/m³	0.2			0.2	
PROC9	265.4 mg/m³	0.6			0.6	
PROC14	88.47 mg/m³	0.2			0.2	

Acute - systemic effects						
PROC1	0.177 mg/m³	< 0.01			< 0.01	
PROC1	0.124 mg/m³	< 0.01			< 0.01	

Local - Inhalation					
DNEL			Acute: 442 mg/m³ Long-term: 221 mg/m³		
Contributing scenario	Acute	RCR	Long term	RCR	Assessment method
PROC1 X	0.177 mg/m³	< 0.01	0.044 mg/m³	< 0.01	
PROC1 X	0.124 mg/m³	< 0.01	0.031 mg/m³	< 0.01	
PROC2 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC2 X	61.93 mg/m³	0.14	15.48 mg/m³	0.07	
PROC2 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC4 X	353.9 mg/m³	0.801	88.47 mg/m³	0.4	
PROC4 X	353.9 mg/m³	0.801	53.08 mg/m³	0.24	
PROC3 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	
PROC5 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC5 X	265.4 mg/m³	0.6	39.81 mg/m³	0.18	
PROC7 X	154.8 mg/m³	0.35	38.7 mg/m³	0.175	
PROC7 X	132.7 mg/m³	0.3	19.9 mg/m³	0.09	
PROC8a X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC8a X	88.47 mg/m³	0.2	13.27 mg/m³	0.06	
PROC8b X	309.6 mg/m³	0.7	77.41 mg/m³	0.35	
PROC8b X	309.6 mg/m³	0.7	46.44 mg/m³	0.21	
PROC10 X	265.4 mg/m³	0.6	66.35 mg/m³	0.3	
PROC10 X	88.47 mg/m³	0.2	13.27 mg/m³	0.06	
PROC13 X	265.4 mg/m³	0.6	66.35 mg/m³	0.3	

Local - Inhalation					
PROC13 X	61.93 mg/m³	0.14	9.29 mg/m³	0.042	
PROC15 X	176.9 mg/m³	0.4	44.23 mg/m³	0.2	
PROC8a, PROC28 X	265.4 mg/m³	0.6	66.35 mg/m³	0.3	
PROC9 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC9 X	265.4 mg/m³	0.6	39.81 mg/m³	0.18	
PROC14 X	88.47 mg/m³	0.2	22.11 mg/m³	0.1	
PROC1 X	0.177 mg/m³	< 0.01	0.044 mg/m³	< 0.01	
PROC1 X	0.124 mg/m³	< 0.01	0.031 mg/m³	< 0.01	

3.2. Environment

Environmental exposure	Unit	Exposure estimation	PNEC	RCR	Assessment method
Freshwater	mg/l	0.033	0.044	0.75	EUSES 2.1.2
Marine water	mg/l	0.00334	0.0044	0.759	EUSES 2.1.2
Freshwater sediment	mg/kg dwt	1.914	2.52	0.76	EUSES 2.1.2
Marine water sediment	mg/kg dwt	≈ 0.191	0.252	0.758	EUSES 2.1.2
Sewage treatment plant	mg/l	0.333	1.6	0.208	EUSES 2.1.2
Soil	mg/kg dwt	0.544	0.852	0.638	EUSES 2.1.2

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Wear suitable gloves tested to EN374.

4.2. Environment

Guidance - Environment	Common practices vary across sites thus conservative process release estimates used. Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.

Additional good practice advice beyond the REACH CSA

Additional good practice advice	Wear suitable gloves (tested to EN374) and eye protection