SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Creation Date 11-Jun-2009 **Revision Date** 06-Dec-2024 **Revision Number** 3

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Description:	**Tetrahydrofuran**
Cat No. :	**TS/0203/15; TS/0203/25**
Synonyms	THF
Index No	603-025-00-0
CAS No	109-99-9
EC No	203-726-8
Molecular Formula	C4 H8 O
REACH registration number	01-2119444314-46-0079

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

Recommended Use	Laboratory chemicals. See Annex for full list.
Sector of use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Product category	PC21 - Laboratory chemicals
Process categories	PROC3 - Use in closed batch process (synthesis or formulation); Industrial setting PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) PROC 8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC15 - Use as a laboratory reagent see SECTION 16 for a complete list of uses for which an exposure scenario is provided as an annex
Environmental release category	As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.
Uses advised against	Food, drug, pesticide or biocidal product use Not suitable for concentration or distillation SU21 - Consumer uses: Private households (= general public = consumers) REACH Annex XVII Restriction - refer to SECTION 15

1.3. Details of the supplier of the safety data sheet

Company

EU entity/business name
Thermo Fisher Scientific
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium

UK entity/business name
Fisher Scientific UK
Bishop Meadow Road, Loughborough,
Leicestershire LE11 5RG, United Kingdom

Swiss distributor - Fisher Scientific AG
Neuhofstrasse 11, CH 4153 Reinach
Tel: +41 (0) 56 618 41 11
e-mail - infoch@thermofisher.com

E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

Tel: 01509 231166
Chemtrec US: (800) 424-9300
Chemtrec EU: 001-703-527-3887

For customers in Switzerland:
Tox Info Suisse Emergency Number: **145 (24hr)**
Tox Info Suisse: +41-44 251 51 51 (Emergency number from abroad)
Chemtrec (24h) Toll-Free: 0800 564 402
Chemtrec Local: +41-43 508 20 11 (Zurich)

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards

Flammable liquids	Category 2 (H225)

Health hazards

Acute oral toxicity	Category 4 (H302)
Serious Eye Damage/Eye Irritation	Category 2 (H319)
Carcinogenicity	Category 2 (H351)
Specific target organ toxicity - (single exposure)	Category 3 (H335) (H336)

Environmental hazards
Based on available data, the classification criteria are not met

Full text of Hazard Statements: see section 16

2.2. Label elements

Signal Word **Danger**

Hazard Statements

H225 - Highly flammable liquid and vapor
H302 - Harmful if swallowed
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness
H351 - Suspected of causing cancer
EUH019 - May form explosive peroxides

Precautionary Statements

P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P312 - Call a POISON CENTER or doctor if you feel unwell

2.3. Other hazards

Substance is not considered persistent, bioaccumulative and toxic (PBT) / very persistent and very bioaccumulative (vPvB)
Toxic to terrestrial vertebrates
This product does not contain any known or suspected endocrine disruptors

Section 3: Composition/information on ingredients

3.1. Substances

Component	CAS No	EC No	Weight %	CLP Classification - Regulation (EC) No 1272/2008
Tetrahydrofuran	109-99-9	203-726-8	>99.9	Flam. Liq. 2 (H225) Acute Tox. 4 (H302) Eye Irrit. 2 (H319) STOT SE 3 (H335) STOT SE 3 (H336) Carc. 2 (H351) (EUH019)
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	128-37-0	EEC No. 204-881-4	0.025	Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410)

Component	Specific concentration limits (SCL's)	M-Factor	Component notes
Tetrahydrofuran	Acute Tox. 4 :: C>82.5% Eye Irrit. 2 :: C>=25% STOT SE 3 :: C>=25%	-	-
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	-	1	-

REACH registration number	01-2119444314-46-0079

Full text of Hazard Statements: see section 16

Section 4: First aid measures

4.1. Description of first aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention immediately if symptoms occur.

Ingestion Do NOT induce vomiting. Call a physician or poison control center immediately.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. Get medical attention.

Self-Protection of the First Aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

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

Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting: Causes central nervous system depression

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

Notes to Physician Treat symptomatically. Symptoms may be delayed.

Section 5: Firefighting measures

5.1. Extinguishing media

Suitable Extinguishing Media
Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist may be used to cool closed containers.

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. May form explosive peroxides. Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO), Carbon dioxide (CO_2), peroxides.

5.3. Advice for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Use personal protective equipment as required. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges. Avoid contact with skin and eyes. Keep people away from and upwind of spill/leak.

6.2. Environmental precautions

Should not be released into the environment.

6.3. Methods and material for containment and cleaning up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

Section 7: Handling and storage

7.1. Precautions for safe handling

Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment/face protection. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharges. Use only non-sparking tools. To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded. If peroxide formation is suspected, do not open or move container. Handle under an inert atmosphere.

Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash hands before breaks and after work.

7.2. Conditions for safe storage, including any incompatibilities

Store under an inert atmosphere. Shelf life 30 months (Unopened) or Shelf life: 6 months after opening. Containers should be dated when opened. May form explosive peroxides on prolonged storage. Should crystals form in a peroxidizable liquid, peroxidation may have occurred and the product should be considered extremely dangerous. In this instance, the container should only be opened remotely by professionals. Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks and flame. Flammables area.

Technical Rules for Hazardous Substances (TRGS) 510 Storage Class (LGK) (Germany) Class 3

7.3. Specific end use(s)

Use in laboratories

Section 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limits
List source(s): **EU** - Commission Directive (EU) 2019/1831 of 24 October 2019 establishing a fifth list of indicative occupational exposure limit values pursuant to Council Directive 98/24/EC and amending Commission Directive 2000/39/EC **UK** - EH40/2005 Work Exposure Limits, Forth edition. Published 2020. **IRE -** 2010 Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001. Published by the Health and Safety Authority. **CH** - The Government of

Switzerland has set a directive on limit values for working materials (Grenzwerte am Arbeitsplatz) which is based on the Swiss Federal Regulation "Verordnung über die Verhütung von Unfällen und Berufskrankheiten". This directive is administered, periodically revised and enforced by SUVA (Swiss National Accident Insurance Fund).

Component	European Union	The United Kingdom	France	Belgium	Spain
Tetrahydrofuran	TWA: 50 ppm (8h) TWA: 150 mg/m³ (8h) STEL: 100 ppm (15min) STEL: 300 mg/m³ (15min) Skin	STEL: 100 ppm 15 min STEL: 300 mg/m³ 15 min TWA: 50 ppm 8 hr TWA: 150 mg/m³ 8 hr Skin	TWA / VME: 50 ppm (8 heures). restrictive limit TWA / VME: 150 mg/m³ (8 heures). restrictive limit STEL / VLCT: 100 ppm. restrictive limit STEL / VLCT: 300 mg/m³. restrictive limit Peau	TWA: 50 ppm 8 uren TWA: 150 mg/m³ 8 uren STEL: 100 ppm 15 minuten STEL: 300 mg/m³ 15 minuten Huid	STEL / VLA-EC: 100 ppm (15 minutos). STEL / VLA-EC: 300 mg/m³ (15 minutos). TWA / VLA-ED: 50 ppm (8 horas) TWA / VLA-ED: 150 mg/m³ (8 horas) Piel
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-		STEL: 30 mg/m³ 15 min TWA: 10 mg/m³ 8 hr	TWA / VME: 10 mg/m³ (8 heures).	TWA: 2 mg/m³ 8 uren	TWA / VLA-ED: 10 mg/m³ (8 horas)

Component	Italy	Germany	Portugal	The Netherlands	Finland
Tetrahydrofuran	TWA: 50 ppm 8 ore. Time Weighted Average TWA: 150 mg/m³ 8 ore. Time Weighted Average STEL: 100 ppm 15 minuti. Short-term STEL: 300 mg/m³ 15 minuti. Short-term Pelle	TWA: 50 ppm (8 Stunden). AGW - exposure factor 2 TWA: 150 mg/m³ (8 Stunden). AGW - exposure factor 2 TWA: 20 ppm (8 Stunden). MAK TWA: 60 mg/m³ (8 Stunden). MAK Höhepunkt: 40 ppm Höhepunkt: 120 mg/m³ Haut	STEL: 100 ppm 15 minutos STEL: 300 mg/m³ 15 minutos TWA: 50 ppm 8 horas TWA: 150 mg/m³ 8 horas Pele	huid STEL: 200 ppm 15 minuten STEL: 600 mg/m³ 15 minuten TWA: 100 ppm 8 uren TWA: 300 mg/m³ 8 uren	TWA: 50 ppm 8 tunteina TWA: 150 mg/m³ 8 tunteina STEL: 100 ppm 15 minuutteina STEL: 300 mg/m³ 15 minuutteina Iho
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-		TWA: 10 mg/m³ (8 Stunden). AGW - exposure factor 4 TWA: 10 mg/m³ (8 Stunden). MAK can occur as vapor and aerosol at the same time Höhepunkt: 40 mg/m³	TWA: 2 mg/m³ 8 horas		TWA: 10 mg/m³ 8 tunteina STEL: 20 mg/m³ 15 minuutteina

Component	Austria	Denmark	Switzerland	Poland	Norway
Tetrahydrofuran	Haut MAK-KZGW: 100 ppm 15 Minuten MAK-KZGW: 300 mg/m³ 15 Minuten MAK-TMW: 50 ppm 8 Stunden MAK-TMW: 150 mg/m³ 8 Stunden	TWA: 50 ppm 8 timer TWA: 150 mg/m³ 8 timer STEL: 300 mg/m³ 15 minutter STEL: 100 ppm 15 minutter Hud	Haut/Peau STEL: 100 ppm 15 Minuten STEL: 300 mg/m³ 15 Minuten TWA: 50 ppm 8 Stunden TWA: 150 mg/m³ 8 Stunden	STEL: 300 mg/m³ 15 minutach TWA: 150 mg/m³ 8 godzinach	TWA: 50 ppm 8 timer TWA: 150 mg/m³ 8 timer STEL: 75 ppm 15 minutter. value calculated STEL: 187.5 mg/m³ 15 minutter. value calculated Hud
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	MAK-TMW: 10 mg/m³ 8 Stunden	TWA: 10 mg/m³ 8 timer STEL: 20 mg/m³ 15 minutter	STEL: 40 mg/m³ 15 Minuten TWA: 10 mg/m³ 8 Stunden		

Component	Bulgaria	Croatia	Ireland	Cyprus	Czech Republic
Tetrahydrofuran	TWA: 50.0 ppm TWA: 150.0 mg/m³ STEL : 100 ppm STEL : 300.0 mg/m³ Skin notation	kože TWA-GVI: 50 ppm 8 satima. TWA-GVI: 150 mg/m³ 8 satima. STEL-KGVI: 100 ppm 15 minutama. STEL-KGVI: 300 mg/m³ 15 minutama.	TWA: 50 ppm 8 hr. TWA: 150 mg/m³ 8 hr. STEL: 100 ppm 15 min STEL: 300 mg/m³ 15 min Skin	Skin-potential for cutaneous absorption STEL: 100 ppm STEL: 300 mg/m³ TWA: 50 ppm TWA: 150 mg/m³	TWA: 150 mg/m³ 8 hodinách. Potential for cutaneous absorption Ceiling: 300 mg/m³

Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	TWA: 10 mg/m³ STEL : 50 mg/m³	TWA-GVI: 10 mg/m³ 8 satima.	TWA: 2 mg/m³ 8 hr. STEL: 6 mg/m³ 15 min		

Component	Estonia	Gibraltar	Greece	Hungary	Iceland
Tetrahydrofuran	Nahk TWA: 50 ppm 8 tundides. TWA: 150 mg/m³ 8 tundides. STEL: 100 ppm 15 minutites. STEL: 300 mg/m³ 15 minutites.	Skin notation TWA: 50 ppm 8 hr TWA: 150 mg/m³ 8 hr STEL: 100 ppm 15 min STEL: 300 mg/m³ 15 min	STEL: 250 ppm STEL: 735 mg/m³ TWA: 200 ppm TWA: 590 mg/m³	STEL: 300 mg/m³ 15 percekben. CK STEL: 100 ppm 15 percekben. CK TWA: 150 mg/m³ 8 órában. AK TWA: 50 ppm 8 órában. AK lehetséges borön keresztüli felszívódás	STEL: 100 ppm STEL: 300 mg/m³ TWA: 50 ppm 8 klukkustundum. TWA: 150 mg/m³ 8 klukkustundum. Skin notation
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-			TWA: 10 mg/m³		TWA: 10 mg/m³ 8 klukkustundum. Ceiling: 20 mg/m³

Component	Latvia	Lithuania	Luxembourg	Malta	Romania
Tetrahydrofuran	skin - potential for cutaneous exposure STEL: 100 ppm STEL: 300 mg/m³ TWA: 50 ppm TWA: 150 mg/m³	TWA: 50 ppm IPRD TWA: 150 mg/m³ IPRD Oda STEL: 100 ppm STEL: 300 mg/m³	Possibility of significant uptake through the skin TWA: 50 ppm 8 Stunden TWA: 150 mg/m³ 8 Stunden STEL: 100 ppm 15 Minuten STEL: 300 mg/m³ 15 Minuten	possibility of significant uptake through the skin TWA: 50 ppm TWA: 150 mg/m³ STEL: 100 ppm 15 minuti STEL: 300 mg/m³ 15 minuti	Skin notation TWA: 50 ppm 8 ore TWA: 150 mg/m³ 8 ore STEL: 100 ppm 15 minute STEL: 300 mg/m³ 15 minute

Component	Russia	Slovak Republic	Slovenia	Sweden	Turkey
Tetrahydrofuran	MAC: 100 mg/m³	Ceiling: 300 mg/m³ Potential for cutaneous absorption TWA: 50 ppm TWA: 150 mg/m³	TWA: 50 ppm 8 urah TWA: 150 mg/m³ 8 urah Koža STEL: 100 ppm 15 minutah STEL: 300 mg/m³ 15 minutah	Binding STEL: 100 ppm 15 minuter Binding STEL: 300 mg/m³ 15 minuter TLV: 50 ppm 8 timmar. NGV TLV: 150 mg/m³ 8 timmar. NGV	Deri TWA: 50 ppm 8 saat TWA: 150 mg/m³ 8 saat STEL: 100 ppm 15 dakika STEL: 300 mg/m³ 15 dakika
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-			TWA: 10 mg/m³ 8 urah inhalable fraction STEL: 40 mg/m³ 15 minutah inhalable fraction		

Biological limit values

List source(s):

Component	European Union	United Kingdom	France	Spain	Germany
Tetrahydrofuran				Tetrahydrofuran: 2 mg/L urine end of shift	Tetrahydrofuran: 2 mg/L urine (end of shift)

Component	Gibraltar	Latvia	Slovak Republic	Luxembourg	Turkey
Tetrahydrofuran			Tetrahydrofuran: 2 mg/L urine end of exposure or work shift		

Monitoring methods

BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.

MDHS70 General methods for sampling airborne gases and vapours

MDHS 88 Volatile organic compounds in air. Laboratory method using diffusive samplers, solvent desorption and gas chromatography

MDHS 96 Volatile organic compounds in air - Laboratory method using pumped solid sorbent tubes, solvent desorption and gas

chromatography

Derived No Effect Level (DNEL) / Derived Minimum Effect Level (DMEL)
See table for values

Component	Acute effects local (Dermal)	Acute effects systemic (Dermal)	Chronic effects local (Dermal)	Chronic effects systemic (Dermal)
Tetrahydrofuran 109-99-9 (>99.9)				DNEL = 12.6mg/kg bw/day
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- 128-37-0 (0.025)				DNEL = 0.5mg/kg bw/day

Component	Acute effects local (Inhalation)	Acute effects systemic (Inhalation)	Chronic effects local (Inhalation)	Chronic effects systemic (Inhalation)
Tetrahydrofuran 109-99-9 (>99.9)	DNEL = 300mg/m³	DNEL = 96mg/m³	DNEL = 150mg/m³	DNEL = 72.4mg/m³
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- 128-37-0 (0.025)				DNEL = 3.5mg/m³

Predicted No Effect Concentration (PNEC)
See values below.

Component	Fresh water	Fresh water sediment	Water Intermittent	Microorganisms in sewage treatment	Soil (Agriculture)
Tetrahydrofuran 109-99-9 (>99.9)	PNEC = 4.32mg/L	PNEC = 23.3mg/kg sediment dw	PNEC = 21.6mg/L	PNEC = 4.6mg/L	PNEC = 2.13mg/kg soil dw
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- 128-37-0 (0.025)	PNEC = 0.199µg/L	PNEC = 99.6µg/kg sediment dw	PNEC = 1.99µg/L	PNEC = 0.17mg/L	PNEC = 47.69µg/kg soil dw

Component	Marine water	Marine water sediment	Marine water Intermittent	Food chain	Air
Tetrahydrofuran 109-99-9 (>99.9)	PNEC = 0.432mg/L	PNEC = 2.33mg/kg sediment dw		PNEC = 67mg/kg food	
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- 128-37-0 (0.025)	PNEC = 0.0199µg/L	PNEC = 9.96µg/kg sediment dw		PNEC = 8.33mg/kg food	

8.2. Exposure controls

Engineering Measures
Use explosion-proof electrical/ventilating/lighting/equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source

Personal protective equipment
Eye Protection Goggles (European standard - EN 166)

Hand Protection Protective gloves

Glove material	Breakthrough time	Glove thickness	EU standard	Glove comments
Butyl rubber	< 25 minutes	0.6 mm	Level 1 EN 374	Permeation rate 106 µg/cm2/min As tested under EN374-3 Determination of Resistance to Permeation by Chemicals
Neoprene gloves	< 15 minutes	0.45 mm		

Skin and body protection Long sleeved clothing.

Inspect gloves before use. observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. (Refer to manufacturer/supplier for information) gloves are suitable for the task: Chemical compatability, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion. gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

Large scale/emergency use Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced
Recommended Filter type: Organic gases and vapours filter Type A Brown conforming to EN14387

Small scale/Laboratory use Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended half mask:- Valve filtering: EN405; or; Half mask: EN140; plus filter, EN 141
When RPE is used a face piece Fit Test should be conducted

Environmental exposure controls No information available.

Section 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical State	Liquid	
Appearance	Colorless	
Odor	Petroleum distillates	
Odor Threshold	No data available	
Melting Point/Range	-108.4 °C / -163.1 °F	
Softening Point	No data available	
Boiling Point/Range	66 °C / 150.8 °F	
Flammability (liquid)	Highly flammable	On basis of test data
Flammability (solid,gas)	Not applicable	Liquid
Explosion Limits	**Lower** 1.5 vol% **Upper** 12 vol%	
Flash Point	-21 °C / -5.8 °F	**Method -** No information available
Autoignition Temperature	215 - °C / 419 - °F	
Decomposition Temperature	No data available	
pH	7-8	20% aq. solution
Viscosity	0.456 mPas @ 20°C Dynamic	
Water Solubility	Miscible	
Solubility in other solvents	No information available	

Partition Coefficient (n-octanol/water)

Component	**log Pow**
Tetrahydrofuran	0.45
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	5.1

Vapor Pressure	170 mbar @ 20 °C	
Density / Specific Gravity	0.880	
Bulk Density	Not applicable	Liquid
Vapor Density	2.5 (Ether = 1.0)	(Air = 1.0)
Particle characteristics	Not applicable (liquid)	

9.2. Other information

Molecular Formula	C4 H8 O
Molecular Weight	72.11
Explosive Properties	Vapors may form explosive mixtures with air
Evaporation Rate	> 1 (Ether = 1.0) - (Butyl Acetate = 1.0)

Section 10: Stability and reactivity

10.1. Reactivity

Yes. May form explosive peroxides

10.2. Chemical stability

Stable under recommended storage conditions. Reacts with air to form peroxides. May form explosive peroxides on prolonged storage. Hygroscopic.

10.3. Possibility of hazardous reactions

Hazardous Polymerization	Hazardous polymerization may occur.
Hazardous Reactions	None under normal processing.

10.4. Conditions to avoid

Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition. Exposure to moist air or water.

10.5. Incompatible materials

Strong oxidizing agents. Acids.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO_2). peroxides.

Section 11: Toxicological information

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

Product Information

(a) acute toxicity;

Oral	Category 4
Dermal	Based on available data, the classification criteria are not met
Inhalation	Based on available data, the classification criteria are not met

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrahydrofuran	1650 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	180 mg/L (Rat) 1 h 53.9 mg/L (Rat) 4 h
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	> 6 g/kg (Rat)	> 2 g/kg (Rat)	-

(b) skin corrosion/irritation; Based on available data, the classification criteria are not met

(c) serious eye damage/irritation; Category 2

(d) respiratory or skin sensitization;

Respiratory Based on available data, the classification criteria are not met

Skin Based on available data, the classification criteria are not met

Component	Test method	Test species	Study result
Tetrahydrofuran 109-99-9 (>99.9)	Local Lymph Node Assay OECD Test Guideline 429	mouse	non-sensitising

(e) germ cell mutagenicity; Based on available data, the classification criteria are not met

Component	Test method	Test species	Study result
Tetrahydrofuran 109-99-9 (>99.9)	OECD Test Guideline 476 Gene cell mutation --- OECD Test Guideline 473 Chromosomal aberration assay	in vivo Mammalian --- in vitro Mammalian	negative --- negative

(f) carcinogenicity; Category 2

Limited evidence of a carcinogenic effect

Component	EU	UK	Germany	IARC
Tetrahydrofuran				Group 2B

(g) reproductive toxicity; Based on available data, the classification criteria are not met

Component	Test method	Test species / Duration	Study result
Tetrahydrofuran 109-99-9 (>99.9)	OECD Test Guideline 416	Rat 2 Generation	NOAEL = 3,000 ppm

(h) STOT-single exposure; Category 3

Results / Target organs Respiratory system, Central nervous system (CNS).

(i) STOT-repeated exposure; Based on available data, the classification criteria are not met

Target Organs None known.

(j) aspiration hazard; Based on available data, the classification criteria are not met

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

Symptoms / effects,both acute and delayed Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Causes central nervous system depression.

11.2. Information on other hazards

Endocrine Disrupting Properties Assess endocrine disrupting properties for human health. This product does not contain any known or suspected endocrine disruptors.

Component	EU National Authorities Endocrine Disruptor Lists - Health
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl- 128-37-0 (0.025)	List II

Section 12: Ecological information

12.1. Toxicity

Ecotoxicity effects Do not empty into drains. .

Component	Freshwater Fish	Water Flea	Freshwater Algae
Tetrahydrofuran	2160 mg/l LC50 = 96 h Pimephales promelas Leuciscus idus: LC50: 2820 mg/L/48h	EC50 48 h 3485 mg/l EC50: >10000 mg/L/24h	
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	LC50 = 0.199 mg/L 96h	EC50 >0.31 mg/L 48h	EC50 = 0.758 mg/L 96h EC50 = 6 mg/L 72 h

Component	Microtox	M-Factor
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	EC50 = 7.82 mg/L 5 min EC50 = 8.57 mg/L 15 min EC50 = 8.98 mg/L 30 min	1

12.2. Persistence and degradability Product is biodegradable

Persistence Persistence is unlikely, based on information available.

Degradation in sewage treatment plant Contains no substances known to be hazardous to the environment or not degradable in waste water treatment plants.

12.3. Bioaccumulative potential Bioaccumulation is unlikely

Component	log Pow	Bioconcentration factor (BCF)
Tetrahydrofuran	0.45	No data available
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	5.1	230 - 2500 dimensionless

12.4. Mobility in soil The product contains volatile organic compounds (VOC) which will evaporate easily from all surfaces Will likely be mobile in the environment due to its volatility. Disperses rapidly in air

12.5. Results of PBT and vPvB assessment Substance is not considered persistent, bioaccumulative and toxic (PBT) / very persistent and very bioaccumulative (vPvB).

12.6. Endocrine disrupting properties

Endocrine Disruptor Information

Component	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances
Tetrahydrofuran	Group III Chemical	

12.7. Other adverse effects

Persistent Organic Pollutant This product does not contain any known or suspected substance

Ozone Depletion Potential This product does not contain any known or suspected substance

Section 13: Disposal considerations

13.1. Waste treatment methods

Waste from Residues/Unused Products Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of this container to hazardous or special waste collection point. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep product and

empty container away from heat and sources of ignition.

European Waste Catalogue (EWC) According to the European Waste Catalog, Waste Codes are not product specific, but application specific.

Other Information Do not flush to sewer. Waste codes should be assigned by the user based on the application for which the product was used. Can be landfilled or incinerated, when in compliance with local regulations.

Switzerland - Waste Ordinance Disposal should be in accordance with applicable regional, national and local laws and regulations. Ordinance on the Avoidance and the Disposal of Waste (Waste Ordinance, ADWO) SR 814.600
https://www.fedlex.admin.ch/eli/cc/2015/891/en

Section 14: Transport information

IMDG/IMO

14.1. UN number UN2056
14.2. UN proper shipping name TETRAHYDROFURAN
14.3. Transport hazard class(es) 3
14.4. Packing group II

ADR

14.1. UN number UN2056
14.2. UN proper shipping name TETRAHYDROFURAN
14.3. Transport hazard class(es) 3
14.4. Packing group II

IATA

14.1. UN number UN2056
14.2. UN proper shipping name TETRAHYDROFURAN
14.3. Transport hazard class(es) 3
14.4. Packing group II

14.5. Environmental hazards No hazards identified

14.6. Special precautions for user No special precautions required.

14.7. Maritime transport in bulk according to IMO instruments Not applicable, packaged goods

Section 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories
Europe (EINECS/ELINCS/NLP), China (IECSC), Taiwan (TCSI), Korea (KECL), Japan (ENCS), Japan (ISHL), Canada (DSL/NDSL), Australia (AICS), New Zealand (NZIoC), Philippines (PICCS). US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)

Component	CAS No	EINECS	ELINCS	NLP	IECSC	TCSI	KECL	ENCS	ISHL
Tetrahydrofuran	109-99-9	203-726-8	-	-	X	X	KE-33454	X	X
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl -	128-37-0	204-881-4	-	-	X	X	KE-03079	X	X

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	DSL	NDSL	AICS	NZIoC	PICCS
Tetrahydrofuran	109-99-9	X	ACTIVE	X	-	X	X	X
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl -	128-37-0	X	ACTIVE	X	-	X	X	X

Legend: X - Listed '-' - Not Listed **KECL** - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Tetrahydrofuran	109-99-9	-	Use restricted. See entry 75. (see link for restriction details)	-
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	128-37-0	-	-	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Seveso III Directive (2012/18/EC)

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements
Tetrahydrofuran	109-99-9	Not applicable	Not applicable
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	128-37-0	Not applicable	Not applicable

Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals
Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work .
Take note of Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values

National Regulations

UK - Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment

WGK Classification See table for values

Component	Germany - Water Classification (AwSV)	Germany - TA-Luft Class
Tetrahydrofuran	WGK1	
Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	WGK 2	

Component	France - INRS (Tables of occupational diseases)
Tetrahydrofuran	Tableaux des maladies professionnelles (TMP) - RG 84

Swiss Regulations

Article 4 para. 4 of the Ordinance on the protection of young people in the workplace (SR 822.115) and Article 1 lit. f of the EAER regulation on hazardous work and young people (SR 822.115.2).
Take note on Article 13 Maternity Ordinance (SR 822.111.52) with regards expectant and nursing mothers.

Component	Switzerland - Ordinance on the Reduction of Risk from handling of hazardous substances preparation (SR 814.81)	Switzerland - Ordinance on Incentive Taxes on Volatile Organic Compounds (OVOC)	Switzerland - Ordinance of the Rotterdam Convention on the Prior Informed Consent Procedure
Tetrahydrofuran 109-99-9 (>99.9)		Group I	

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has been conducted by the manufacturer/importer

Section 16: Other information

Full text of H-Statements referred to under sections 2 and 3

H225 - Highly flammable liquid and vapor
H302 - Harmful if swallowed
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H336 - May cause drowsiness or dizziness
H351 - Suspected of causing cancer
EUH019 - May form explosive peroxides

Legend

CAS - Chemical Abstracts Service
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
IECSC - Chinese Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
ENCS - Japanese Existing and New Chemical Substances
AICS - Australian Inventory of Chemical Substances
NZIoC - New Zealand Inventory of Chemicals

WEL - Workplace Exposure Limit
ACGIH - American Conference of Governmental Industrial Hygienists
DNEL - Derived No Effect Level
RPE - Respiratory Protective Equipment
LC50 - Lethal Concentration 50%
NOEC - No Observed Effect Concentration
PBT - Persistent, Bioaccumulative, Toxic
TWA - Time Weighted Average
IARC - International Agency for Research on Cancer
Predicted No Effect Concentration (PNEC)
LD50 - Lethal Dose 50%
EC50 - Effective Concentration 50%
POW - Partition coefficient Octanol:Water
vPvB - very Persistent, very Bioaccumulative

ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road
IMO/IMDG - International Maritime Organization/International Maritime Dangerous Goods Code
OECD - Organisation for Economic Co-operation and Development
BCF - Bioconcentration factor
ICAO/IATA - International Civil Aviation Organization/International Air Transport Association
MARPOL - International Convention for the Prevention of Pollution from Ships
ATE - Acute Toxicity Estimate
VOC - (volatile organic compound)

Key literature references and sources for data

https://echa.europa.eu/information-on-chemicals
Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice

Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.
Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.
First aid for chemical exposure, including the use of eye wash and safety showers.
Fire prevention and fighting, identifying hazards and risks, static electricity, explosive atmospheres posed by vapours and dusts.
Chemical incident response training.

Creation Date	11-Jun-2009
Revision Date	06-Dec-2024
Revision Summary	SDS sections updated, 1, 7, 10.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006. COMMISSION REGULATION (EU) 2020/878 amending Annex II to Regulation (EC) No 1907/2006 .

For Switzerland - Compiled in accordance with the technical provisions referred to in Annex 2, Number 3, ChemO (SR 813.11 - Ordinance on Protection against Dangerous Substances and Preparations).

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Tetrahydrofuran - Exposure Scenarios

CAS No	REACH registration number	EC No
109-99-9	01-2119444314-46-xxxx	203-726-8

Exposure Scenarios Overview

Title	Sector of use	Process category(ies)	Environmental release category	ES Identifier
Manufacture or use as an intermediate or process chemical or extraction agent	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites	1, 2, 3, 4, 8a, 8b, 15	ERC1 - Manufacture of substances	ES1-M1 THF
Formulation of preparations and/or re-packaging	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15	ERC2 - Formulation of preparations	ES2-F1 THF
Laboratory use	SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites	9, 10, 15	ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles	ES3-L1 THF
Laboratory use	SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	9, 10, 15	ERC8a - Wide dispersive indoor use of processing aids in open systems	ES4-L2 THF

Exposure scenario

ES1 Manufacture of THF - ES1-M1 THF

Section 1 - Identification of the use

Main user group Industrial uses: Uses of substances as such or in preparations at industrial sites

Type Worker

Processes, tasks, activities covered Manufacture or use as an intermediate or process chemical or extraction agent. Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities

Sector(s) of use

SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites
SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process category(ies)

PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15 - Use as laboratory reagent

Environmental release category(ies) ERC1 - Manufacture of substances
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Further information
Under certain circumstances, stabilisers in THF (e.g. Butylated hydroxytoluene) which prevent peroxide formation can be depleted and a risk of explosion may be present to industrial or professional workers. Activities which involve processing, concentration or distillation steps may significantly reduce the amount of stabiliser in THF. In order to control the risk of explosion from elevated peroxide levels which may occur when performing the activities, risk Management Measures will need to be implemented by the Downstream Users of such activities:
Use the minimum amount of product required to complete activity
Do not store distilled THF for long periods
Store in a cool, dark, well ventilated place
Perform periodic testing to determine peroxide levels in stored THF and document
Test peroxide levels in THF always before carrying out distillation or concentration steps Applicable peroxide methods would be:
1) Peroxide test strips: e.g. EMQuant® Peroxide test strips (0-100ppm range)
2) ASTM E 299-08 Standard Test Method for Trace Amounts of Peroxide in Organic Solvents.
If peroxide level is above 25ppm, not recommended for distillation activities.
If peroxide level is above 100 ppm DO NOT use, consult Health and Safety Manager and contact manufacturer/supplier to discuss disposal. If the Risk Management Measures above are applied then the risk of explosion due to elevated peroxide levels is negligible. Downstream Users should satisfy themselves that they are implementing the Risk Management Measures and take the necessary actions to ensure risk is controlled.

Section 2 - Operational Conditions and Risk Management Measures

Product characteristics

Physical State	Liquid
pH	7-8
Water Solubility	Miscible
Vapor Pressure	170 hPa @ 20 °C

Covers concentrations up to 100 %

Section 2.1 - Control of environmental exposure

Environmental release category(ies)
ERC1 - Manufacture of substances
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Control of environmental exposure
Inherently biodegradable
Annual amount used in the EU 140000 t/a

Section 2.2 - Control of worker exposure

General information on risk management related to physicochemical hazard
Remove all sources of ignition. Take precautionary measures against static charges. Use only non-sparking tools. Control entry to work area. Suitable fire detection system. Keep equipment under negative pressure. Check atmosphere for explosiveness and oxygen deficiencies. Segregate work area and mark with appropriate signs in accordance with local/regional/national legislation.

Control of worker exposure

Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor use

Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Use of closed production equipment, with no extraction, except when opening vessels for additions/sampling
Technical conditions and measures to control dispersion from source towards the worker	Undertake operation under enclosed conditions
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes
	---
Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Outdoor
Assumes process temperature up to	<=40°C
Covers skin contact area up to	480 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure samples are obtained under containment or extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator providing a minimum efficiency of 90% (APF 10) Use eye protection according to EN 166, designed to protect against liquid splashes
	---
Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Ensure samples are obtained under containment or extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes
	---
Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 1 hour
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Handle substance within a predominantly closed system provided with extract ventilation Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Ensure samples are obtained under containment or extract ventilation

Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 90% (APF 10)

Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Outdoor
Assumes process temperature up to	<=40°C
Covers skin contact area up to	960 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Avoid carrying out operation for more than 1 hour Ensure operation is undertaken outdoors
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 95% (APF 20)

Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 1 hour
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	960 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Fill containers/cans at dedicated fill points supplied with local extract ventilation Local exhaust ventilation - efficiency of at least 95%
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes
	---
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor use
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Handle in a fume cupboard or under extract ventilation Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training Wear a respirator providing a minimum efficiency of 90%

Control of consumer exposure	Not intended for consumer use

Section 3 - Exposure estimation

Environment

Environmental release category(ies)

ERC1 - Manufacture of substances
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Predicted No Effect Concentration (PNEC) - See values below

Fresh water	4.32 mg/l	**Marine water**	0.432 mg/l
Fresh water sediment	23.3 mg/kg	**Marine water sediment**	2.3 mg/kg
Water Intermittent	21.6 mg/l	**Soil (Agriculture)**	2.1 mg/kg
Microorganisms in sewage treatment	4.6 mg/l		

Health

Derived No Effect Level (DNEL) - See table for values

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				12.6 mg/kg bw/day
Inhalation	300 mg/m³	96 mg/m³	150 mg/m³	72.4 mg/m³

Process category(ies)	Exposure route	Predicted exposure level	Risk characterization ratio (RCR)
PROC1 - Use in closed process, no likelihood of exposure	Worker - inhalative, long-term - systemic	0.03 mg/m³	<0.01
	Worker - inhalative, short-term - systemic	0.12 mg/m³	<0.01
	Worker - inhalative, long-term - local	0.03 mg/m³	<0.01
	Worker - inhalative, short-term - local	0.12 mg/m³	<0.01
	Worker - dermal, long-term - systemic	0.034 mg/kg bw/day	<0.01
	Worker - combined, long-term - systemic		<0.01
	Worker - combined, short-term - systemic		<0.01
PROC2 - Use in closed, continuous process with occasional controlled exposure	Worker - inhalative, long-term - systemic	5.258 mg/m³	0.073
	Worker - inhalative, short-term - systemic	21.03 mg/m³	0.219
	Worker - inhalative, long-term - local	5.258 mg/m³	0.035
	Worker - inhalative, short-term - local	21.03 mg/m³	0.07
	Worker - dermal, long-term - systemic	1.37 mg/kg bw/day	0.109
	Worker - combined, long-term - systemic		0.181
	Worker - combined, short-term - systemic		0.219
PROC3 - Use in closed batch process (synthesis or formulation)	Worker - inhalative, long-term - systemic	3.004 mg/m³	0.042
	Worker - inhalative, short-term - systemic	60.09 mg/m³	0.626
	Worker - inhalative, long-term - local	3.004 mg/m³	0.02
	Worker - inhalative, short-term - local	60.09 mg/m³	0.2
	Worker - dermal, long-term - systemic	0.138 mg/kg bw/day	0.011
	Worker - combined, long-term - systemic		0.052
	Worker - combined, short-term -		0.626

	systemic		
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	Worker - inhalative, long-term - systemic	0.601 mg/m³	<0.01
	Worker - inhalative, short-term - systemic	12.02 mg/m³	0.125
	Worker - inhalative, long-term - local	0.601 mg/m³	<0.01
	Worker - inhalative, short-term - local	12.02 mg/m³	0.04
	Worker - dermal, long-term - systemic	1.372 mg/kg bw/day	0.109
	Worker - combined, long-term - systemic		0.117
	Worker - combined, short-term - systemic		0.125
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities	Worker - inhalative, long-term - systemic	5.258 mg/m³	0.073
	Worker - inhalative, short-term - systemic	94 mg/m³ (Stoffenmanager 5.0)	0.979
	Worker - inhalative, long-term - local	5.258 mg/m³	0.035
	Worker - inhalative, short-term - local	105.2 mg/m³	0.351
	Worker - dermal, long-term - systemic	2.742 mg/kg bw/day	0.218
	Worker - combined, long-term - systemic		0.29
	Worker - combined, short-term - systemic		0.979
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	Worker - inhalative, long-term - systemic	4.507 mg/m³	0.062
	Worker - inhalative, short-term - systemic	90.13 mg/m³	0.939
	Worker - inhalative, long-term - local	4.507 mg/m³	0.03
	Worker - inhalative, short-term - local	90.13 mg/m³	0.3
	Worker - dermal, long-term - systemic	2.742 mg/kg bw/day	0.218
	Worker - combined, long-term - systemic		0.28
	Worker - combined, short-term - systemic		0.939
PROC15 - Use as laboratory reagent	Worker - inhalative, long-term - systemic	15.02 mg/m³	0.208
	Worker - inhalative, short-term - systemic	60.09 mg/m³	0.626
	Worker - inhalative, long-term - local	15.02 mg/m³	0.1
	Worker - inhalative, short-term - local	60.09 mg/m³	0.2
	Worker - dermal, long-term - systemic	0.34 mg/kg bw/day	0.027
	Worker - combined, long-term - systemic		0.235
	Worker - combined, short-term - systemic		0.626

Calculation method Used ECETOC TRA model, Used Stoffenmanager model

Remarks
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions

outlined in section 2 are implemented

Section 4 - Guidance to check compliance with the exposure scenario

Used ECETOC TRA model
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented
ECHA guidance for downstream users

Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Tetrahydrofuran - Exposure Scenarios

CAS No	REACH registration number	EC No
109-99-9	01-2119444314-46-xxxx	203-726-8

Exposure scenario

ES2 Formulating/re-packing - ES2-F1 THF

Section 1 - Identification of the use

Main user group Industrial uses: Uses of substances as such or in preparations at industrial sites

Type Worker

Processes, tasks, activities covered Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

Sector(s) of use SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

Process category(ies)
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelettization
PROC15 - Use as laboratory reagent

Environmental release category(ies) ERC2 - Formulation of preparations (mixtures)
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Further information
Under certain circumstances, stabilisers in THF (e.g. Butylated hydroxytoluene) which prevent peroxide formation can be depleted and a risk of explosion may be present to industrial or professional workers. Activities which involve processing, concentration or distillation steps may significantly reduce the amount of stabiliser in THF. In order to control the risk of explosion from elevated peroxide levels which may occur when performing the activities, risk Management Measures will need to be implemented by the Downstream Users of such activities:
Use the minimum amount of product required to complete activity
Do not store distilled THF for long periods
Store in a cool, dark, well ventilated place

Perform periodic testing to determine peroxide levels in stored THF and document
Test peroxide levels in THF always before carrying out distillation or concentration steps Applicable peroxide methods would be:
1) Peroxide test strips: e.g. EMQuant® Peroxide test strips (0-100ppm range)
2) ASTM E 299-08 Standard Test Method for Trace Amounts of Peroxide in Organic Solvents.
If peroxide level is above 25ppm, not recommended for distillation activities.
If peroxide level is above 100 ppm DO NOT use, consult Health and Safety Manager and contact manufacturer/supplier to discuss disposal. If the Risk Management Measures above are applied then the risk of explosion due to elevated peroxide levels is negligible. Downstream Users should satisfy themselves that they are implementing the Risk Management Measures and take the necessary actions to ensure risk is controlled.

Section 2 - Operational Conditions and Risk Management Measures

Product characteristics

Physical State	Liquid
pH	7-8
Water Solubility	Miscible
Vapor Pressure	170 hPa @ 20 °C

Covers concentrations up to 100 %

Section 2.1 - Control of environmental exposure

Environmental release category(ies)
ERC2 - Formulation of preparations (mixtures)
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Control of environmental exposure
Inherently biodegradable
Annual amount used in the EU 28500 t/a

Section 2.2 - Control of worker exposure

General information on risk management related to physicochemical hazard
Remove all sources of ignition. Take precautionary measures against static charges. Use only non-sparking tools. Control entry to work area. Suitable fire detection system. Keep equipment under negative pressure. Check atmosphere for explosiveness and oxygen deficiencies. Segregate work area and mark with appropriate signs in accordance with local/regional/national legislation.

Control of worker exposure

Process category(ies)	PROC1 - Use in closed process, no likelihood of exposure
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Use frequency	Covers frequency up to 5 days per week
Indoor/Outdoor use	Indoor use
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Use of closed production equipment, with no extraction, except when opening vessels for additions/sampling
Technical conditions and measures to control dispersion from source towards the worker	Undertake operation under enclosed conditions
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes

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Process category(ies)	PROC2 - Use in closed, continuous process with occasional controlled exposure
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Ensure samples are obtained under containment or extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes

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Process category(ies)	PROC3 - Use in closed batch process (synthesis or formulation)
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 1 hour
Indoor/Outdoor use	Indoor
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Ensure samples are obtained under containment or extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes

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Process category(ies)	PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Ensure samples are obtained under containment or extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 90% (APF 10)

Process category(ies)	PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 1 hour

Indoor/Outdoor use	Indoor
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 90% (APF 10)

Process category(ies)	PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities
Covers concentrations up to	>25% - <50%
Exposure duration	Avoid carrying out operation for more than 1 hour
Indoor/Outdoor use	Outdoor
Assumes process temperature up to	40°C
Covers skin contact area up to	960 cm2
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 95% (APF 20)

Process category(ies)	PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 1 hour
Indoor/Outdoor use	Indoor
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	960 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Fill containers/cans at dedicated fill points supplied with local extract ventilation Local exhaust ventilation - efficiency of at least 95%
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes
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Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a predominantly closed system provided with extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator providing a minimum efficiency of 90% (APF 10) Use eye protection according to EN 166, designed to protect against liquid splashes
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Process category(ies)	PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelettization
Covers concentrations up to	100%
Exposure duration	Avoid carrying out activities involving exposure for more than 4 hours
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator providing a minimum efficiency of 90% (APF 10) Use eye protection according to EN 166, designed to protect against liquid splashes ----------
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Exposure duration	Avoid carrying out operation for more than 8h
Indoor/Outdoor use	Indoor use
Assumes process temperature up to	40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Handle in a fume cupboard or under extract ventilation Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training Wear a respirator providing a minimum efficiency of 90% ----------
Control of consumer exposure	Not intended for consumer use

Section 3 - Exposure estimation

Environment

Environmental release category(ies)

ERC2 - Formulation of preparations (mixtures)

As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Predicted No Effect Concentration (PNEC) - See values below

Fresh water	4.32 mg/l	**Marine water**	0.432 mg/l
Fresh water sediment	23.3 mg/kg	**Marine water sediment**	2.3 mg/kg
Water Intermittent	21.6 mg/l	**Soil (Agriculture)**	2.1 mg/kg
Microorganisms in sewage treatment	4.6 mg/l		

Health

Derived No Effect Level (DNEL) - See table for values

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				12.6 mg/kg bw/day
Inhalation	300 mg/m³	96 mg/m³	150 mg/m³	72.4 mg/m³

Process category(ies)	Exposure route	Predicted exposure level	Risk characterization ratio (RCR)
PROC1 - Use in closed process, no likelihood of exposure	Worker - inhalative, long-term - systemic	0.03 mg/m³	<0.01
	Worker - inhalative, short-term - systemic	0.12 mg/m³	<0.01
	Worker - inhalative, long-term - local	0.03 mg/m³	<0.01
	Worker - inhalative, short-term - local	0.12 mg/m³	<0.01
	Worker - dermal, long-term - systemic	0.034 mg/kg bw/day	<0.01
	Worker - combined, long-term - systemic		<0.01
	Worker - combined, short-term - systemic		<0.01
PROC2 - Use in closed, continuous process with occasional controlled exposure	Worker - inhalative, long-term - systemic	7.511 mg/m³	0.104
	Worker - inhalative, short-term - systemic	30.04 mg/m³	0.313
	Worker - inhalative, long-term - local	7.511 mg/m³	0.05
	Worker - inhalative, short-term - local	30.04 mg/m³	0.1
	Worker - dermal, long-term - systemic	1.37 mg/kg bw/day	0.109
	Worker - combined, long-term - systemic		0.213
	Worker - combined, short-term - systemic		0.313
PROC3 - Use in closed batch process (synthesis or formulation)	Worker - inhalative, long-term - systemic	15.02 mg/m³	0.208
	Worker - inhalative, short-term - systemic	60.09 mg/m³	0.626
	Worker - inhalative, long-term - local	15.02 mg/m³	0.1
	Worker - inhalative, short-term - local	60.09 mg/m³	0.2
	Worker - dermal, long-term - systemic	0.69 mg/kg bw/day	0.055
	Worker - combined, long-term - systemic		0.262
	Worker - combined, short-term - systemic		0.626
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises	Worker - inhalative, long-term - systemic	3.004 mg/m³	0.042
	Worker - inhalative, short-term - systemic	12.02 mg/m³	0.125
	Worker - inhalative, long-term - local	3.004 mg/m³	0.02
	Worker - inhalative, short-term - local	12.02 mg/m³	0.04
	Worker - dermal, long-term - systemic	6.86 mg/kg bw/day	0.544
	Worker - combined, long-term - systemic		0.586
	Worker - combined, short-term - systemic		0.125
PROC5 - Mixing or blending in batch processes for formulation of preparations	Worker - inhalative, long-term - systemic	1.502 mg/m³	0.021

and articles (multistage and/or significant contact)			
	Worker - inhalative, short-term - systemic	30.04 mg/m³	0.313
	Worker - inhalative, long-term - local	1.502 mg/m³	0.01
	Worker - inhalative, short-term - local	30.04 mg/m³	0.1
	Worker - dermal, long-term - systemic	2.742 mg/kg bw/day	0.218
	Worker - combined, long-term - systemic		0.238
	Worker - combined, short-term - systemic		0.313
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities	Worker - inhalative, long-term - systemic	5.258 mg/m³	0.073
	Worker - inhalative, short-term - systemic	94 mg/m³ (Stoffenmanager 5.0)	0.979
	Worker - inhalative, long-term - local	5.258 mg/m³	0.035
	Worker - inhalative, short-term - local	105.2 mg/m³	0.351
	Worker - dermal, long-term - systemic	2.742 mg/kg bw/day	0.218
	Worker - combined, long-term - systemic		0.29
	Worker - combined, short-term - systemic		0.979
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	Worker - inhalative, long-term - systemic	4.507 mg/m³	0.062
	Worker - inhalative, short-term - systemic	90.13 mg/m³	0.939
	Worker - inhalative, long-term - local	4.507 mg/m³	0.03
	Worker - inhalative, short-term - local	90.13 mg/m³	0.3
	Worker - dermal, long-term - systemic	2.742 mg/kg bw/day	0.218
	Worker - combined, long-term - systemic		0.28
	Worker - combined, short-term - systemic		0.939
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Worker - inhalative, long-term - systemic	6.009 mg/m³	0.083
	Worker - inhalative, short-term - systemic	24.04 mg/m³	0.25
	Worker - inhalative, long-term - local	6.009 mg/m³	0.04
	Worker - inhalative, short-term - local	24.0 mg/m³	0.08
	Worker - dermal, long-term - systemic	6.86 mg/kg bw/day	0.544
	Worker - combined, long-term - systemic		0.627
	Worker - combined, short-term - systemic		0.25
PROC14 - Production of preparations or articles by tableting, compression, extrusion, pelettization	Worker - inhalative, long-term - systemic	4.507 mg/m³	0.062
	Worker - inhalative, short-term - systemic	30.04 mg/m³	0.313
	Worker - inhalative, long-term - local	4.507 mg/m³	0.03
	Worker - inhalative, short-term -	30.04 mg/m³	0.1

	local		
	Worker - dermal, long-term - systemic	2.058 mg/kg bw/day	0.163
	Worker - combined, long-term - systemic		0.226
	Worker - combined, short-term - systemic		0.313
PROC15 - Use as laboratory reagent	Worker - inhalative, long-term - systemic	15.02 mg/m³	0.208
	Worker - inhalative, short-term - systemic	60.09 mg/m³	0.626
	Worker - inhalative, long-term - local	15.02 mg/m³	0.1
	Worker - inhalative, short-term - local	60.09 mg/m³	0.2
	Worker - dermal, long-term - systemic	0.34 mg/kg bw/day	0.027
	Worker - combined, long-term - systemic		0.235
	Worker - combined, short-term - systemic		0.626

Calculation method Used ECETOC TRA model, Used Stoffenmanager model

Remarks
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented

Section 4 - Guidance to check compliance with the exposure scenario

Used ECETOC TRA model
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented
ECHA guidance for downstream users

Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Tetrahydrofuran - Exposure Scenarios

CAS No	REACH registration number	EC No
109-99-9	01-2119444314-46-xxxx	203-726-8

Exposure scenario

ES3 Laboratory Use (Industrial) - ES3-L1 THF

Section 1 - Identification of the use

Main user group Industrial uses: Uses of substances as such or in preparations at industrial sites

Type Worker

Processes, tasks, activities covered Laboratory reagent and solvent involving transfer from larger to small containers and vice versa.

Sector(s) of use SU3 - Industrial uses: Uses of substances as such or in preparations at industrial sites

Process category(ies) PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10 - Roller application or brushing
PROC15 - Use as laboratory reagent

Environmental release category(ies) ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Further information
Under certain circumstances, stabilisers in THF (e.g. Butylated hydroxytoluene) which prevent peroxide formation can be depleted and a risk of explosion may be present to industrial or professional workers. Activities which involve processing, concentration or distillation steps may significantly reduce the amount of stabiliser in THF. In order to control the risk of explosion from elevated peroxide levels which may occur when performing the activities, risk Management Measures will need to be implemented by the Downstream Users of such activities:
Use the minimum amount of product required to complete activity
Do not store distilled THF for long periods
Store in a cool, dark, well ventilated place
Perform periodic testing to determine peroxide levels in stored THF and document
Test peroxide levels in THF always before carrying out distillation or concentration steps Applicable peroxide methods would be:
1) Peroxide test strips: e.g. EMQuant® Peroxide test strips (0-100ppm range)
2) ASTM E 299-08 Standard Test Method for Trace Amounts of Peroxide in Organic Solvents.
If peroxide level is above 25ppm, not recommended for distillation activities.
If peroxide level is above 100 ppm DO NOT use, consult Health and Safety Manager and contact manufacturer/supplier to discuss disposal. If the Risk Management Measures above are applied then the risk of explosion due to elevated peroxide levels is negligible. Downstream Users should satisfy themselves that they are implementing the Risk Management Measures and take the necessary actions to ensure risk is controlled.

Section 2 - Operational Conditions and Risk Management Measures

Product characteristics

Physical State	Liquid
pH	7-8
Water Solubility	Miscible
Vapor Pressure	170 hPa @ 20 °C

Covers concentrations up to 100 %

Section 2.1 - Control of environmental exposure

Environmental release category(ies)
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Control of environmental exposure
Inherently biodegradable
Annual amount used in the EU 400 t/a

Section 2.2 - Control of worker exposure

General information on risk management related to physicochemical hazard
Remove all sources of ignition. Take precautionary measures against static charges. Use only non-sparking tools. Control entry to work area. Suitable fire detection system. Keep equipment under negative pressure. Check atmosphere for explosiveness and oxygen deficiencies. Segregate work area and mark with appropriate signs in accordance with local/regional/national legislation.

Control of worker exposure

Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	5-10
Covers skin contact area up to	480cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Technical conditions and measures to control dispersion from source towards the worker	Handle substance within a predominantly closed system provided with extract ventilation
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training Use eye protection according to EN 166, designed to protect against liquid splashes ----------
Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	480cm2
Organisational measures to prevent	Local exhaust ventilation - efficiency of at least 90%

/limit releases, dispersion and exposure	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator providing a minimum efficiency of 90% (APF 10) Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training ----------
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor use
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	1-3
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 90%
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training ----------

Control of consumer exposure Not intended for consumer use

Section 3 - Exposure estimation

Environment

Environmental release category(ies)

ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles

As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Predicted No Effect Concentration (PNEC) - See values below

Fresh water	4.32 mg/l	**Marine water**	0.432 mg/l
Fresh water sediment	23.3 mg/kg	**Marine water sediment**	2.3 mg/kg
Water Intermittent	21.6 mg/l	**Soil (Agriculture)**	2.1 mg/kg
Microorganisms in sewage treatment	4.6 mg/l		

Health

Derived No Effect Level (DNEL) - See table for values

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				12.6 mg/kg bw/day
Inhalation	300 mg/m³	96 mg/m³	150 mg/m³	72.4 mg/m³

Process category(ies)	Exposure route	Predicted exposure level	Risk characterization ratio (RCR)
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Worker - inhalative, long-term - systemic	3.605 mg/m³	0.05
	Worker - inhalative, short-term - systemic	72.11 mg/m³	0.751
	Worker - inhalative, long-term -	3.605 mg/m³	0.024

	local		
	Worker - inhalative, short-term - local	72.11 mg/m³	0.24
	Worker - dermal, long-term - systemic	0.274 mg/kg bw/day	0.022
	Worker - combined, long-term - systemic		0.072
	Worker - combined, short-term - systemic		0.751
PROC10 - Roller application or brushing	Worker - inhalative, long-term - systemic	1.502 mg/m³	0.021
	Worker - inhalative, short-term - systemic	30.04 mg/m³	0.313
	Worker - inhalative, long-term - local	1.502 mg/m³	0.01
	Worker - inhalative, short-term - local	30.04 mg/m³	0.1
	Worker - dermal, long-term - systemic	5.486 mg/kg bw/day	0.435
	Worker - combined, long-term - systemic		0.456
	Worker - combined, short-term - systemic		0.313
PROC15 - Use as laboratory reagent	Worker - inhalative, long-term - systemic	3.004 mg/m³	0.042
	Worker - inhalative, short-term - systemic	60.09 mg/m³	0.626
	Worker - inhalative, long-term - local	3.004 mg/m³	0.02
	Worker - inhalative, short-term - local	60.09 mg/m³	0.2
	Worker - dermal, long-term - systemic	0.068 mg/kg bw/d	<0.01
	Worker - combined, long-term - systemic		0.047
	Worker - combined, short-term - systemic		0.626

Calculation method Used ECETOC TRA model

Remarks
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented

Section 4 - Guidance to check compliance with the exposure scenario

Used ECETOC TRA model
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented
ECHA guidance for downstream users

Annex to the Safety Data Sheet according to Regulation (EC) No 1907/2006 [REACH]

Tetrahydrofuran - Exposure Scenarios

CAS No	REACH registration number	EC No
109-99-9	01-2119444314-46-xxxx	203-726-8

Exposure scenario

ES4 Laboratory Use (Professional) - ES4-L2 THF

Section 1 - Identification of the use

Main user group Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Type Worker

Processes, tasks, activities covered Laboratory reagent and solvent involving transfer from larger to small containers and vice versa.

Sector(s) of use SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

Process category(ies) PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC10 - Roller application or brushing
PROC15 - Use as laboratory reagent

Environmental release category(ies) ERC8a - Wide dispersive indoor use of processing aids in open systems
As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Further information
Under certain circumstances, stabilisers in THF (e.g. Butylated hydroxytoluene) which prevent peroxide formation can be depleted and a risk of explosion may be present to industrial or professional workers. Activities which involve processing, concentration or distillation steps may significantly reduce the amount of stabiliser in THF. In order to control the risk of explosion from elevated peroxide levels which may occur when performing the activities, risk Management Measures will need to be implemented by the Downstream Users of such activities:
Use the minimum amount of product required to complete activity
Do not store distilled THF for long periods
Store in a cool, dark, well ventilated place
Perform periodic testing to determine peroxide levels in stored THF and document
Test peroxide levels in THF always before carrying out distillation or concentration steps Applicable peroxide methods would be:
1) Peroxide test strips: e.g. EMQuant® Peroxide test strips (0-100ppm range)
2) ASTM E 299-08 Standard Test Method for Trace Amounts of Peroxide in Organic Solvents.
If peroxide level is above 25ppm, not recommended for distillation activities.
If peroxide level is above 100 ppm DO NOT use, consult Health and Safety Manager and contact manufacturer/supplier to discuss disposal. If the Risk Management Measures above are applied then the risk of explosion due to elevated peroxide levels is negligible. Downstream Users should satisfy themselves that they are implementing the Risk Management Measures and take the necessary actions to ensure risk is controlled.

Section 2 - Operational Conditions and Risk Management Measures

Product characteristics

Physical State	Liquid
pH	7-8
Water Solubility	Miscible
Vapor Pressure	170 hPa @ 20 °C

Covers concentrations up to 100 %

Section 2.1 - Control of environmental exposure

Environmental release category(ies)

ERC8a - Wide dispersive indoor use of processing aids in open systems

As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Control of environmental exposure

Inherently biodegradable

Annual amount used in the EU 350 t/a

Section 2.2 - Control of worker exposure

General information on risk management related to physicochemical hazard

Remove all sources of ignition. Take precautionary measures against static charges. Use only non-sparking tools. Control entry to work area. Suitable fire detection system. Keep equipment under negative pressure. Check atmosphere for explosiveness and oxygen deficiencies. Segregate work area and mark with appropriate signs in accordance with local/regional/national legislation.

Control of worker exposure

Process category(ies)	PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	3-5
Covers skin contact area up to	480cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 80%
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves (tested to EN374) in combination with specific activity training Use eye protection according to EN 166, designed to protect against liquid splashes Wear a respirator providing a minimum efficiency of 90% (APF 10) ----------

Process category(ies)	PROC10 - Roller application or brushing
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	3-5
Covers skin contact area up to	960cm2
Organisational measures to prevent /limit releases, dispersion and	Local exhaust ventilation - efficiency of at least 80%

exposure	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear a respirator providing a minimum efficiency of 90% (APF 10) Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training ----------
Process category(ies)	PROC15 - Use as laboratory reagent
Covers concentrations up to	100%
Exposure duration	< 1 hour(s)
Indoor/Outdoor use	Indoor use
Assumes process temperature up to	<=40°C
Minimum room ventilation rate for handling/application (air changes per hour)	3-5
Covers skin contact area up to	240 cm2
Organisational measures to prevent /limit releases, dispersion and exposure	Local exhaust ventilation - efficiency of at least 80%
Conditions and measures related to personal protection, hygiene and health evaluation	Use eye protection according to EN 166, designed to protect against liquid splashes Wear chemically resistant gloves (tested to EN374) in combination with specific activity training ----------

Control of consumer exposure Not intended for consumer use

Section 3 - Exposure estimation

Environment

Environmental release category(ies)

ERC8a - Wide dispersive indoor use of processing aids in open systems

As a result of the hazard assessment carried out in accordance to Article 14.3 of REACH, the registrant concludes that the substance does not meet the criteria for classification as hazardous to the environment, therefore exposure assessments and risk characterisation for environmental endpoints were not developed. PNECs have been developed for completeness in the registration dossier.

Predicted No Effect Concentration (PNEC) - See values below

Fresh water	4.32 mg/l	**Marine water**	0.432 mg/l
Fresh water sediment	23.3 mg/kg	**Marine water sediment**	2.3 mg/kg
Water Intermittent	21.6 mg/l	**Soil (Agriculture)**	2.1 mg/kg
Microorganisms in sewage treatment	4.6 mg/l		

Health

Derived No Effect Level (DNEL) - See table for values

Route of exposure	Acute effects (local)	Acute effects (systemic)	Chronic effects (local)	Chronic effects (systemic)
Oral				
Dermal				12.6 mg/kg bw/day
Inhalation	300 mg/m³	96 mg/m³	150 mg/m³	72.4 mg/m³

Process category(ies)	Exposure route	Predicted exposure level	Risk characterization ratio (RCR)
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	Worker - inhalative, long-term - systemic	2.103 mg/m³	0.029
	Worker - inhalative, short-term - systemic	42.06 mg/m³	0.438
	Worker - inhalative, long-term - local	2.103 mg/m³	0.014

	Worker - inhalative, short-term - local	42.06 mg/m³	0.14
	Worker - dermal, long-term - systemic	1.372 mg/kg/bw/day	0.109
	Worker - combined, long-term - systemic		0.138
	Worker - combined, short-term - systemic		0.438
PROC10 - Roller application or brushing	Worker - inhalative, long-term - systemic	4.206 mg/m³	0.058
	Worker - inhalative, short-term - systemic	84.12 mg/m³	0.876
	Worker - inhalative, long-term - local	4.206 mg/m³	0.028
	Worker - inhalative, short-term - local	84.12 mg/m³	0.28
	Worker - dermal, long-term - systemic	1.097 mg/kg bw/day	0.087
	Worker - combined, long-term - systemic		0.145
	Worker - combined, short-term - systemic		0.876
PROC15 - Use as laboratory reagent	Worker - inhalative, long-term - systemic	4.206 mg/m³	0.058
	Worker - inhalative, short-term - systemic	84.12 mg/m³	0.876
	Worker - inhalative, long-term - local	4.206 mg/m³	0.028
	Worker - inhalative, short-term - local	84.12 mg/m³	0.28
	Worker - dermal, long-term - systemic	0.014 mg/kg bw/day	<0.01
	Worker - combined, long-term - systemic		0.059
	Worker - combined, short-term - systemic		0.876

Calculation method Used ECETOC TRA model

Remarks
Predicted exposures are not expected to exceed the DN(M)EL when the risk management measures/operational conditions outlined in section 2 are implemented

Section 4 - Guidance to check compliance with the exposure scenario

Used ECETOC TRA model
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html)
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented
ECHA guidance for downstream users