

SAFETY DATA SHEET

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

1.1. Product identifier

Name of the substance	Sulphur
Identification number	016-094-00-1
Registration number	01-2119487295-27-0049
Synonyms	None.
SDS number	2006
Issue date	27-July-2011
Version number	04
Revision date	05-July-2013
Supersedes date	25-August-2011

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

Identified uses	Distribution of a substance. Formulation & (re) packaging of substances and mixtures. Manufacture of substance. Use as an intermediate.
Uses advised against	None known.

1.3. Details of the supplier of the safety data sheet

Supplier

Company name	Valero Energy Ltd
Address	1 Westferry Circus Canary Wharf London E14 4HA UK
Telephone	01/210 345 4593 (General information; US)
e-mail	CorpHSE@valero.com
Contact person	Industrial Hygienist

1.4. Emergency telephone number 0044/(0)18 65 407333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

The substance has been assessed and/or tested for its physical, health and environmental hazards and the following classification applies.

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification Xi;R38

The full text for all R-phrases is displayed in section 16.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards		
Skin corrosion/irritation	Category 2	H315 - Causes skin irritation.

Hazard summary

Physical hazards	Not classified for physical hazards.
Health hazards	Irritating to skin. Occupational exposure to the substance or mixture may cause adverse health effects.
Environmental hazards	Not classified for hazards to the environment.
Specific hazards	May cause irritation of nose, throat and mucous membranes. Fine particles may form explosive mixtures with air.
Main symptoms	Skin irritation. Irritation of eyes and mucous membranes. Symptoms include itching, burning, redness, and tearing of eyes. Central nervous system depression. Hydrogen sulphide, a highly toxic gas, may be present. Signs and symptoms of overexposure to hydrogen sulphide include respiratory and eye irritation, dizziness, nausea, coughing, a sensation of dryness and pain in the nose, and loss of consciousness. Odour does not provide a reliable indicator of the presence of hazardous levels in the atmosphere.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Sulphur
Identification number 016-094-00-1
Hazard pictograms



Signal word Warning
Hazard statements H315 - Causes skin irritation.

Precautionary statements

Prevention P280 - Wear protective gloves.
Response P302 + P352 - IF ON SKIN: Wash with plenty of soap and water. If skin irritation occurs, seek medical advice/attention.
Storage P233 - Keep container tightly closed.
Disposal P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information Not applicable.

2.3. Other hazards Not a PBT or vPvB substance or mixture. Hydrogen sulfide (H₂S) can accumulate in the headspace of storage tanks and reach potentially hazardous concentrations.

SECTION 3: Composition/information on ingredients**3.1. Substances****General information**

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Sulphur	99 - 100	7704-34-9 231-722-6	01-2119487295-27-0049	016-094-00-1	
Classification:	DSD: Xi;R38				
	CLP: Skin Irrit. 2;H315				

DSD: Directive 67/548/EEC.
 CLP: Regulation No. 1272/2008.
 #: This substance has workplace exposure limit(s).

Impurities

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Hydrogen sulphide	0 - 1	7783-06-4 231-977-3	-	016-001-00-4	#

Composition comments The full text for all R- and H-phrases is displayed in section 16. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4: First aid measures

General information Get medical attention if any discomfort develops.

4.1. Description of first aid measures

Inhalation Move to fresh air. Get medical attention if discomfort develops or persists.
 If there is any suspicion of inhalation of H₂S:
 Rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures.
 Remove casualty to fresh air as quickly as possible.
 Immediately begin artificial respiration if breathing has ceased.
 Provision of oxygen may help.
 Obtain medical advice for further treatment.

Skin contact Immediately remove contaminated clothing. Wash with soap and water. Continue to rinse for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye contact Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

Ingestion Immediately rinse mouth and drink plenty of water. Do not induce vomiting. Get medical attention if irritation develops and persists.

4.2. Most important symptoms and effects, both acute and delayed Skin irritation. Irritation of eyes and mucous membranes. Symptoms include itching, burning, redness, and tearing of eyes. Central nervous system depression.

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

SECTION 5: Firefighting measures

General fire hazards Combustible. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

5.1. Extinguishing media

Suitable extinguishing media Water spray. Water fog. Dry chemical powder. Carbon dioxide (CO₂).

Unsuitable extinguishing media Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture High concentrations of dust may form explosive mixture with air.

5.3. Advice for firefighters

Special protective equipment for firefighters Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

Special fire fighting procedures Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Ensure adequate ventilation. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Wear protective clothing as described in section 8 of this safety data sheet.

For emergency responders Keep unnecessary personnel away. Use personal protection as recommended in section 8 of the SDS.

6.2. Environmental precautions Prevent further leakage or spillage if safe to do so. Do not contaminate water.

6.3. Methods and material for containment and cleaning up Extinguish all flames in the vicinity. Dike the spilled material, where this is possible. Prevent entry into waterways, sewers, basements or confined areas.

Sweep or scoop up and remove. Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Nonsparking tools should be used. Nonsparking tools should be used. Clean surface thoroughly to remove residual contamination. This material and its container must be disposed of as hazardous waste.

Large Spills: Prevent product from entering drains. Do not allow material to contaminate ground water system. Should not be released into the environment.

6.4. Reference to other sections For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Use only with adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Use work methods which minimise dust production. Wash thoroughly after handling. Risk of dust explosion: Ground container and transfer equipment to eliminate static electric sparks. Use Personal Protective Equipment recommended in section 8 of the SDS. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities Store in tightly closed original container in a dry, cool and well-ventilated place. Store away from incompatible materials. Keep container tightly closed and sealed until ready for use.

7.3. Specific end use(s) For detailed information, see section 15. Recommendations given in the exposure scenario for the uses are distributed and annexed as separate documents to this eSDS.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

Austria. MAK List

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	Ceiling	7 mg/m3
		5 ppm
	MAK	7 mg/m3 5 ppm

Belgium. Exposure Limit Values.

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
		10 ppm
	TWA	7 mg/m3 5 ppm

Bulgaria

Material	Type	Value
Sulphur (CAS 7704-34-9)	TWA	300 mg/m3

Bulgaria. OELs. Regulation No 13 on protection of workers against risks of exposure to chemical agents at work

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	21 mg/m3
	TWA	14 mg/m3

Cyprus. OELs. Control of factory atmosphere and dangerous substances in factories regulation, PI 311/73, as amended.

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TWA	15 mg/m3
		10 ppm

Czech Republic

Material	Type	Value
Sulphur (CAS 7704-34-9)	Ceiling	1000 mg/m3
	TWA	400 mg/m3

Czech Republic. OELs. Government Decree 361

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	Ceiling	14 mg/m3
	TWA	7 mg/m3

Denmark. Exposure Limit Values

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TLV	7 mg/m3
		5 ppm

Estonia. OELs. Occupational Exposure Limits of Hazardous Substances. (Annex of Regulation No. 293 of 18 September 2001)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
		10 ppm
	TWA	7 mg/m3 5 ppm

Finland. Workplace Exposure Limits

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
		10 ppm

Finland. Workplace Exposure Limits

Impurities	Type	Value
	TWA	7 mg/m ³ 5 ppm

France. Threshold Limit Values (VLEP) for Occupational Exposure to Chemicals in France, INRS ED 984

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	VLE	14 mg/m ³
	VME	10 ppm 7 mg/m ³ 5 ppm

Germany. DFG MAK List (advisory OELs). Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (DFG)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TWA	7,1 mg/m ³ 5 ppm

Germany. TRGS 900, Limit Values in the Ambient Air at the Workplace

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	AGW	7,1 mg/m ³ 5 ppm

Greece. OELs (Decree No. 90/1999, as amended)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	21 mg/m ³
	TWA	15 ppm 15 mg/m ³ 10 ppm

Hungary. OELs. Joint Decree on Chemical Safety of Workplaces

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m ³
	TWA	7 mg/m ³

Iceland

Material	Type	Value
Sulphur (CAS 7704-34-9)	TWA	180 mg/m ³ 25 ppm

Iceland. OELs. Regulation 154/1999 on occupational exposure limits

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	20 mg/m ³
	TWA	15 ppm 14 mg/m ³ 10 ppm

Ireland. Occupational Exposure Limits

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m ³
	TWA	10 ppm 7 mg/m ³ 5 ppm

Italy

Material	Type	Value
Sulphur (CAS 7704-34-9)	STEL	500 ppm

Italy

Material	Type	Value
	TWA	300 ppm

Italy. OELs

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
	TWA	10 ppm
		7 mg/m3
		5 ppm

Latvia. OELs. Occupational exposure limit values of chemical substances in work environment

Components	Type	Value
Sulphur (CAS 7704-34-9)	TWA	6 mg/m3
Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
	TWA	10 ppm
		3 mg/m3
		5 ppm

Lithuania. OELs. Limit Values for Chemical Substances, General Requirements (Hygiene Norm HN 23:2007)

Components	Type	Value
Sulphur (CAS 7704-34-9)	TWA	6 mg/m3
Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	Ceiling	20 mg/m3
	STEL	15 ppm
		14 mg/m3
	TWA	10 ppm
7 mg/m3		
		5 ppm

Luxembourg. Binding Occupational exposure limit values (Annex I), Memorial A

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
	TWA	10 ppm
		7 mg/m3
		5 ppm

Netherlands. OELs (binding)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TWA	2,3 mg/m3

Norway. Administrative Norms for Contaminants in the Workplace

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	Ceiling	14 mg/m3
	TLV	10 ppm
		7 mg/m3
		5 ppm

Poland. MACs. Minister of Labour and Social Policy Regarding Maximum Allowable Concentrations and Intensities in Working Environment

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m3
	TWA	7 mg/m3

Portugal. VLEs. Norm on occupational exposure to chemical agents (NP 1796)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	15 ppm
	TWA	10 ppm

Romania

Material	Type	Value
Sulphur (CAS 7704-34-9)	STEL	500 mg/m ³
	TWA	300 mg/m ³

Romania. OELs. Protection of workers from exposure to chemical agents at the workplace

Components	Type	Value	Form
Sulphur (CAS 7704-34-9)	STEL	15 mg/m ³	Dust.
Impurities Hydrogen sulphide (CAS 7783-06-4)	STEL	15 mg/m ³	
		10,8 ppm	
	TWA	10 mg/m ³	
		7,2 ppm	

Slovakia. OELs. Decree of the government of the Slovak Republic concerning protection of health in work with chemical agents

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TWA	7 mg/m ³
		5 ppm

Slovenia. OELs. Regulations concerning protection of workers against risks due to exposure to chemicals while working (Official Gazette of the Republic of Slovenia)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	TWA	7 mg/m ³
		5 ppm

Spain. Occupational Exposure Limits

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m ³
		10 ppm
	TWA	7 mg/m ³
		5 ppm

Sweden. Occupational Exposure Limit Values

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	Ceiling	20 mg/m ³
		15 ppm
	TWA	14 mg/m ³
		10 ppm

Switzerland. SUVA Grenzwerte am Arbeitsplatz

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14,2 mg/m ³
		10 ppm
	TWA	7,1 mg/m ³
		5 ppm

UK. EH40 Workplace Exposure Limits (WELs)

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m ³
		10 ppm

UK. EH40 Workplace Exposure Limits (WELs)

Impurities	Type	Value
	TWA	7 mg/m ³ 5 ppm

EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU

Impurities	Type	Value
Hydrogen sulphide (CAS 7783-06-4)	STEL	14 mg/m ³
	TWA	10 ppm 7 mg/m ³ 5 ppm

Biological limit values

Hungary. Chemical Safety at Workplace Ordinance Joint Decree No. 25/2000 (Annex 2): Permissible limit values of biological exposure (effect) indices

Components	Value	Determinant	Specimen	Sampling time
Sulphur (CAS 7704-34-9)	25 %	red blood cell or total blood acetylcholinesterase activity (EC. 3.1.1.7.)	Reduction from individual baseline activity in red blood cells	*

* - For sampling details, please see the source document.

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no-effect level (DNEL)

Material	Type	Route	Value	Form
Sulphur (CAS 7704-34-9)	Workers	Dermal	0,5 mg/kg/day	Long term exposure systemic effects
		Inhalation	10 mg/kg/day	Acute exposure systemic effects
		Inhalation	150 mg/m ³	Acute exposure local effects

Predicted no effect concentrations (PNECs) Not available.

8.2. Exposure controls

Appropriate engineering controls Provide adequate general and local exhaust ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

General information Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Keep working clothes separately. Launder contaminated clothing before reuse.

Eye/face protection Wear safety glasses. If splash potential exists, wear full face shield or chemical goggles.

Skin protection

- Hand protection

Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Wear suitable gloves tested to EN374.

- Other

Wear chemical-resistant, impervious gloves. Full body suit and boots are recommended when handling large volumes or in emergency situations. Flame retardant protective clothing is recommended.

Respiratory protection

In case of inadequate ventilation or risk of inhalation of vapours, use suitable respiratory equipment with gas filter (type A2). Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

Thermal hazards

When material is heated, wear gloves to protect against thermal burns.

Hygiene measures

Consult supervisor for special handling instructions. Avoid contact with eyes. Avoid contact with skin. Wash hands before breaks and immediately after handling the product. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practices.

Environmental exposure controls

Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Yellow solid.
Physical state	Solid.
Form	Prills or molten.
Colour	Yellow.
Odour	Sulphurous.
Odour threshold	Not available.
pH	Not available.
Melting point/freezing point	119 °C (246,2 °F)
Initial boiling point and boiling range	444,6 °C (832,28 °F)
Flash point	206,9 °C (404,3 °F)
Evaporation rate	Not applicable.
Flammability (solid, gas)	Combustible dust.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	33
Flammability limit - upper (%)	46
Vapour pressure	Not applicable.
Vapour density	Not applicable.
Relative density	2,08 (15,6°C)
Solubility(ies)	Very slightly soluble in water.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	231,85 °C (449,33 °F)
Decomposition temperature	Not available.
Viscosity	Not applicable.
Explosive properties	Not available.
Oxidizing properties	Not available.

9.2. Other information

Density	2,07 kg/m ³ (20°C)
Molecular formula	S
Molecular weight	32,07

SECTION 10: Stability and reactivity

10.1. Reactivity	The product is stable and non reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Stable under normal temperature conditions and recommended use.
10.3. Possibility of hazardous reactions	Hazardous polymerisation does not occur.
10.4. Conditions to avoid	Heat. Ignition sources. Minimise dust generation and accumulation.
10.5. Incompatible materials	Strong oxidising agents.
10.6. Hazardous decomposition products	Sulphur oxides. Hydrogen sulfide.

SECTION 11: Toxicological information

General information Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Ingestion	May cause discomfort if swallowed.
Inhalation	Inhalation of dusts may cause respiratory irritation.
Skin contact	Causes skin irritation.
Eye contact	Dust in the eyes will cause irritation.

Symptoms Skin irritation. Irritation of eyes and mucous membranes. Symptoms include itching, burning, redness, and tearing of eyes. Central nervous system depression.

11.1. Information on toxicological effects

Acute toxicity Causes skin irritation. May cause eye and respiratory tract irritation.

Product	Species	Test results
Sulphur (CAS 7704-34-9)		
Acute		
<i>Dermal</i>		
LD50	Rabbit	> 2000 mg/kg
<i>Inhalation</i>		
LC50	Rat	> 5,43 mg/l
<i>Oral</i>		
LD50	Rat	> 2000 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

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

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

Germ cell mutagenicity Based on available data, the classification criteria are not met.

Carcinogenicity Based on available data, the classification criteria are not met.

Reproductive toxicity Based on available data, the classification criteria are not met.

Specific target organ toxicity - single exposure Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure Based on available data, the classification criteria are not met.

Aspiration hazard Not an aspiration hazard.

Mixture versus substance information Not available.

Other information No other specific acute or chronic health impact noted.

SECTION 12: Ecological information

12.1. Toxicity The product is not expected to be hazardous to the environment.

12.2. Persistence and degradability The product is not biodegradable.

12.3. Bioaccumulative potential The product is not bioaccumulating.

Partition coefficient n-octanol/water (log Kow) Not available.

Bioconcentration factor (BCF) Not available.

12.4. Mobility in soil No data available.

Mobility in general The product is insoluble or slightly soluble in water.

12.5. Results of PBT and vPvB assessment Not a PBT or vPvB substance or mixture.

12.6. Other adverse effects Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied.

EU waste code 05 01 16
Waste codes should be assigned by the user based on the application for which the product was used.

Disposal methods/information Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground.

SECTION 14: Transport information

ADR	
14.1. UN number	UN1350
14.2. UN proper shipping name	Sulphur
14.3. Transport hazard class(es)	4.1
Subsidiary class(es)	4.1
14.4. Packing group	III
14.5. Environmental hazards	No
Tunnel restriction code	E
Labels required	4.1
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
RID	
14.1. UN number	UN1350
14.2. UN proper shipping name	Sulphur
14.3. Transport hazard class(es)	4.1
Subsidiary class(es)	-
14.4. Packing group	III
14.5. Environmental hazards	No
Labels required	4.1
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
ADN	
14.1. UN number	UN1350
14.2. UN proper shipping name	Sulphur
14.3. Transport hazard class(es)	4.1
Subsidiary class(es)	4.1
14.4. Packing group	III
14.5. Environmental hazards	No
Labels required	4.1
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
IATA	
14.1. UN number	UN1350
14.2. UN proper shipping name	Sulphur
14.3. Transport hazard class(es)	4.1
Subsidiary class(es)	4.1
14.4. Packing group	III
14.5. Environmental hazards	No
Labels required	4.1
ERG Code	3L
14.6. Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
IMDG	
14.1. UN number	UN1350
14.2. UN proper shipping name	Sulphur
14.3. Transport hazard class(es)	4.1
Subsidiary class(es)	4.1
14.4. Packing group	III
14.5. Environmental hazards	
Marine pollutant	No
Labels required	4.1
EmS	F-A, S-G
14.6. Special precautions for user	Special provision 242: Sulphur is not subject to transport regulations when it has been formed to a specific shape (e.g. prills, granules, pellets, pastilles or flakes).

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable. However, this product is a solid. When transported in bulk, it is not covered under Appendix I of the IMSBC Code. The product hazard category is: Group C.

SECTION 15: Regulatory information

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

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I

Not listed.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not regulated.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding

Not regulated.

Other EU regulations

Directive 96/82/EC (Seveso II) on the control of major-accident hazards involving dangerous substances

Not regulated.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Sulphur (CAS 7704-34-9)

Directive 94/33/EC on the protection of young people at work

Not listed.

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006.

National regulations

Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out.

Exposure scenarios relevant for this material are annexed and distributed as separate document to this eSDS.

Distribution of a substance.

Formulation & (re) packaging of substances and mixtures.

Manufacture of substance.

Use as an intermediate.

SECTION 16: Other information

List of abbreviations

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.
DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, bioaccumulative and toxic.
vPvB: Very Persistent and very Bioaccumulative.
eSDS: extended Safety Data Sheet.
CEN: European Committee for Standardisation.

References

Chemical safety report.

Information on evaluation method leading to the classification of mixture

The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.

Full text of any statements or R-phrases and H-statements under Sections 2 to 15

R38 Irritating to skin.

H315 Causes skin irritation.

This SDS contains revisions in the following section(s):

This safety data sheet contains revisions in the following section(s): 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 14, 15, 16.

Training information

Follow training instructions when handling this material.

Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with EC No 1272/2008 by Valero Energy Ltd. Valero Energy Ltd. does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.

Annex to the extended Safety Data Sheet (eSDS)

1 - Exposure Scenario Worker

1. Distribution of substance

List of use descriptors

Sector(s) of Use SU3: Industrial uses

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles.
ERC5: Industrial use resulting in inclusion into or onto a matrix.
ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates).
ERC6b: Industrial use of reactive processing aids.
ERC6c: Industrial use of monomers for manufacture of thermoplastics.
ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.
ERC7: Industrial use of substances in closed systems.
Specific Environmental Release Category: ESVOC SpERC 1.1b.v1

List of names of contributing worker scenarios and corresponding PROCs

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.
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).
PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity

Bulk 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, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use of processing aids in processes and products, not becoming part of articles.

Product characteristics

Concentration of the substance in a mixture

Covers percentage substance in the product up to 100 % (unless stated differently).

Physical state

Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Frequency and duration of use

Batch process Not available.

Continuous process Not available.

Environment factors not influenced by risk management

Local freshwater dilution factor: Not available.

Local marine water dilution factor: Not available.

Other given operational conditions affecting environmental exposure

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Not available.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air Not available.

Soil Not available.

Water Not available.

Sediment Not available.

Remarks Not available.

Organisational measures to prevent/limit release from site Not available.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type Not available.

Discharge rate Not available.

Treatment effectiveness Not available.

Sludge treatment technique Not available.

Measures to limit air emissions Not available.

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment Not available.

Disposal methods Not available.

Treatment effectiveness Not available.

Remarks Not available.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations Not available.

Treatment effectiveness Not available.

Remarks Not available.

Additional good practice advice beyond the REACH CSA Not available.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
Use in closed batch process (synthesis or formulation).
Use in batch and other process (synthesis) where opportunity for exposure arises.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
Transfer of substance or preparation into small containers (dedicated filling line, including weighing).
Use as laboratory reagent.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).

Physical form of the product Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa

Vapour pressure Not available.

Process temperature Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks
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Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Not available.

Technical conditions and measures to control dispersion from source towards the worker Not available.

Organizational measures to prevent/limit releases, dispersion and exposure Not available.

Conditions and measures related to personal protection, hygiene and health evaluations 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 / minimise exposures and to report any skin problems that may develop.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General exposures (closed systems)	0,01 mg/m ³	0	**	Inhalation Exposure
General exposures (closed system) + With sample collection	0,5 mg/m ³	0.125	**	Inhalation Exposure
General exposures (closed system) + Batch process + With sample collection	1 mg/m ³	0.250	**	Inhalation Exposure
Process sampling	1 mg/m ³	0.250	**	Inhalation Exposure
General exposures (open systems)	5 mg/m ³	0.875	**	Inhalation Exposure
Laboratory activities	0,5 mg/m ³	0.125	**	Inhalation Exposure
Bulk transfers + Dedicated facility	5 mg/m ³	0.875	**	Inhalation Exposure
Small package filling	5 mg/m ³	0.875	**	Inhalation Exposure
Equipment cleaning and maintenance	5 mg/m ³	0.250	**	Inhalation Exposure
Bulk product storage	0,5 mg/m ³	0.088	**	Inhalation Exposure

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Health

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Risk Management Measures are based on qualitative risk characterisation.

Available hazard data do not support the need for a DNEL to be established for other health effects. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

2 - Exposure Scenario Worker

1. Formulation & (re)packing of substances and mixtures

List of use descriptors

Sector(s) of Use	SU3: Industrial uses SU10: Formulation [mixing] of preparations and/or re-packaging
Product categories [PC]:	Not available.
Name of contributing environmental scenario and corresponding ERC	ERC2: Formulation of preparations. Specific Environmental Release Category: ESVOC SpERC 2.2.v1
List of names of contributing worker scenarios and corresponding PROCs	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, pelletisation . PROC15: Use as laboratory reagent. PROC23: Open processing and transfer operations with minerals/metals at elevated temperature. PROC24: High (mechanical) energy work-up of substances bound in materials and/or articles.
Further explanations	
Other Process or activity	Bulk 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, maintenance and associated laboratory activities.

2.1. Contributing exposure scenario controlling environmental exposure for Formulation of preparations.

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical state	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa
Viscosity	
Kinematic viscosity	1,6 mm ² /s 40 °C
Dynamic viscosity	Not available.

Amounts used

Frequency and duration of use

Batch process	Not available.
Continuous process	Not available.

Environment factors not influenced by risk management

Local freshwater dilution factor:	Not available.
Local marine water dilution factor:	Not available.

Other given operational conditions affecting environmental exposure

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Not available.
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Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Not available.
Soil	Not available.
Water	Not available.
Sediment	Not available.
Remarks	Not available.

Organisational measures to prevent/limit release from site Not available.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type Not available.
Discharge rate Not available.
Treatment effectiveness Not available.
Sludge treatment technique Not available.
Measures to limit air emissions Not available.

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment Not available.
Disposal methods Not available.
Treatment effectiveness Not available.
Remarks Not available.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations Not available.
Treatment effectiveness Not available.
Remarks Not available.

Additional good practice advice beyond the REACH CSA Not available.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA Use in closed, continuous process with occasional controlled exposure.
Use in closed batch process (synthesis or formulation).
Use in batch and other process (synthesis) where opportunity for exposure arises.
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact).
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
Transfer of substance or preparation into small containers (dedicated filling line, including weighing).
Production of preparations or articles by tableting, compression, extrusion, pelletisation.
Use as laboratory reagent.
Open processing and transfer operations with minerals/metals at elevated temperature.
High (mechanical) energy work-up of substances bound in materials and/or articles.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa
Vapour pressure Not available.
Process temperature Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks
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Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Not available.
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Technical conditions and measures to control dispersion from source towards the worker	Not available.
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Organizational measures to prevent/limit releases, dispersion and exposure	Not available.
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Conditions and measures related to personal protection, hygiene and health evaluations	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 / minimise exposures and to report any skin problems that may develop.
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3. Exposure Estimation**Environment**

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General exposures (closed systems)	0,01 mg/m ³	0	**	Inhalation Exposure
General exposures (closed system) + With sample collection	0,5 mg/m ³	0.125	**	Inhalation Exposure
General exposures (closed system) + Batch process + With sample collection	1 mg/m ³	0.250	**	Inhalation Exposure
Process sampling	1 mg/m ³	0.250	**	Inhalation Exposure
General exposures (open systems)	5 mg/m ³	0.875	**	Inhalation Exposure
Mixing operations (open systems)	5 mg/m ³	0.875	**	Inhalation Exposure
Milling, grinding and similar activities	10 mg/m ³	0.500	**	Inhalation Exposure
Small package filling	20 mg/m ³	0.500	**	Inhalation Exposure
Pelletising	1 mg/m ³	0.250	**	Inhalation Exposure
Laboratory activities	0,5 mg/m ³	0.125	**	Inhalation Exposure
Bulk transfers + Dedicated facility	5 mg/m ³	0.875	**	Inhalation Exposure
Equipment cleaning and maintenance	5 mg/m ³	0.250	**	Inhalation Exposure
General exposures (open systems)	3 mg/m ³	0.750	**	Inhalation Exposure
Bulk product storage	0,5 mg/m ³	0.088	**	Inhalation Exposure

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Health

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Risk Management Measures are based on qualitative risk characterisation.

Available hazard data do not support the need for a DNEL to be established for other health effects. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

3 - Exposure Scenario Worker

1. Manufacture of substance

List of use descriptors

Sector(s) of Use SU3: Industrial uses
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Product categories [PC]: Not available.

Name of contributing environmental scenario and corresponding ERC ERC1: Manufacture of substances.
Specific Environmental Release Category: ESVOC SpERC 1.1.v1

List of names of contributing worker scenarios and corresponding PROCs 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.
PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing).
PROC15: Use as laboratory reagent.

Further explanations

Other Process or activity Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling / recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel / barge, road / rail car and bulk container).

2.1. Contributing exposure scenario controlling environmental exposure for Manufacture of substances.

Product characteristics

Concentration of the substance in a mixture Covers percentage substance in the product up to 100 % (unless stated differently).

Physical state Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa

Viscosity

Kinematic viscosity 1,6 mm²/s 40 °C

Dynamic viscosity Not available.

Amounts used

Frequency and duration of use

Batch process Not available.

Continuous process Not available.

Environment factors not influenced by risk management

Local freshwater dilution factor: Not available.

Local marine water dilution factor: Not available.

Other given operational conditions affecting environmental exposure

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release Not available.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air Not available.

Soil Not available.

Water Not available.

Sediment Not available.

Remarks Not available.

Organisational measures to prevent/limit release from site Not available.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Not available.
Discharge rate	Not available.
Treatment effectiveness	Not available.
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	Not available.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	Not available.
Treatment effectiveness	Not available.
Remarks	Not available.

Additional good practice advice beyond the REACH CSA Not available.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure.
	Use in closed batch process (synthesis or formulation).
	Use in batch and other process (synthesis) where opportunity for exposure arises.
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
	Transfer of substance or preparation into small containers (dedicated filling line, including weighing).
	Use as laboratory reagent.

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa
Vapour pressure	Not available.
Process temperature	Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks
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Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Not available.
Technical conditions and measures to control dispersion from source towards the worker	Not available.
Organizational measures to prevent/limit releases, dispersion and exposure	Not available.
Conditions and measures related to personal protection, hygiene and health evaluations	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 / minimise exposures and to report any skin problems that may develop.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General exposures (closed systems)	0,01 mg/m ³	0	**	Inhalation Exposure
General exposures (closed system) + With sample collection	0,5 mg/m ³	0.125	**	Inhalation Exposure
General exposures (closed system) + Batch process + With sample collection	1 mg/m ³	0.250	**	Inhalation Exposure
Process sampling	1 mg/m ³	0.250	**	Inhalation Exposure
General exposures (open systems)	5 mg/m ³	0.875	**	Inhalation Exposure
Laboratory activities	0,5 mg/m ³	0.125	**	Inhalation Exposure
Bulk transfers + Dedicated facility	5 mg/m ³	0.875	**	Inhalation Exposure
Equipment cleaning and maintenance	5 mg/m ³	0.250	**	Inhalation Exposure
Bulk product storage	0,5 mg/m ³	0.125	**	Inhalation Exposure

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Health

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Risk Management Measures are based on qualitative risk characterisation.

Available hazard data do not support the need for a DNEL to be established for other health effects. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

4 - Exposure Scenario Worker

1. Use as an intermediate

List of use descriptors

Sector(s) of Use

SU3: Industrial uses
SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU9: Manufacture of fine chemicals

Product categories [PC]:

Not available.

Name of contributing environmental scenario and corresponding ERC

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates).

Specific Environmental Release Category: ESVOC SpERC 6.1a.v1

List of names of contributing worker scenarios and corresponding PROCs

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.
PROC22: Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting.
PROC23: Open processing and transfer operations with minerals/metals at elevated temperature.

Further explanations

Other Process or activity

Use of substance as an intermediate. Includes recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

2.1. Contributing exposure scenario controlling environmental exposure for Industrial use resulting in manufacture of another substance (use of intermediates).

Product characteristics

Concentration of the substance in a mixture

Covers percentage substance in the product up to 100 % (unless stated differently).

Physical state

Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa

Viscosity

Kinematic viscosity

1,6 mm²/s 40 °C

Dynamic viscosity

Not available.

Amounts used

Frequency and duration of use

Batch process

Not available.

Continuous process

Not available.

Environment factors not influenced by risk management

Local freshwater dilution factor:

Not available.

Local marine water dilution factor:

Not available.

Other given operational conditions affecting environmental exposure

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

Not available.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air

Not available.

Soil

Not available.

Water

Not available.

Sediment

Not available.

Remarks

Not available.

Organisational measures to prevent/limit release from site

Not available.

Conditions and measures related to municipal sewage treatment plant

Size of municipal sewage system/treatment plant (m3/d)

Type	Not available.
Discharge rate	Not available.
Treatment effectiveness	Not available.
Sludge treatment technique	Not available.
Measures to limit air emissions	Not available.

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment

Suitable waste treatment	Not available.
Disposal methods	Not available.
Treatment effectiveness	Not available.
Remarks	Not available.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment

Suitable recover operations	Not available.
Treatment effectiveness	Not available.
Remarks	Not available.

Additional good practice advice beyond the REACH CSA Not available.

2.2. Contributing exposure scenario controlling worker exposure for Use in closed process, no likelihood of exposure.

Process categories beyond the REACH CSA	Use in closed, continuous process with occasional controlled exposure.
	Use in closed batch process (synthesis or formulation).
	Use in batch and other process (synthesis) where opportunity for exposure arises.
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities.
	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities.
	Use as laboratory reagent.
Potentially closed processing operations with minerals/metals at elevated temperature; industrial setting.	
Open processing and transfer operations with minerals/metals at elevated temperature.	

Product characteristics

Concentration of the substance in a mixture	Covers percentage substance in the product up to 100 % (unless stated differently).
Physical form of the product	Solid at STP, liquid at elevated operating temperature, vapour pressure < 0,5 kPa
Vapour pressure	Not available.
Process temperature	Operation is carried out at elevated temperature (> 20°C above ambient temperature).

Amounts used

Not available.

Frequency and duration of use

	Duration	Frequency of use	Remarks
Covers daily exposures up to 8 hours (unless stated differently).	8		Assumes a good basic standard of occupational hygiene is implemented.

Human factors not influenced by risk management

Exposed skin areas Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Other given operational conditions affecting workers exposure

Area of use	Room size	Temperature	Ventilation rate	Remarks
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Other relevant operational conditions

Not available.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release	Not available.
Technical conditions and measures to control dispersion from source towards the worker	Not available.
Organizational measures to prevent/limit releases, dispersion and exposure	Not available.
Conditions and measures related to personal protection, hygiene and health evaluations	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 / minimise exposures and to report any skin problems that may develop.

3. Exposure Estimation

Environment

See PETRORISK file in IUCLID Section 13 - "LocalCSR" worksheet.

Health

	Exposure level	RCR	Method	Remarks
General exposures (closed systems)	0,01 mg/m ³	0	**	Inhalation Exposure
General exposures (closed system) + With sample collection	0,5 mg/m ³	0.125	**	Inhalation Exposure
General exposures (closed system) + Batch process + With sample collection	1 mg/m ³	0.250	**	Inhalation Exposure
Process sampling	1 mg/m ³	0.250	**	Inhalation Exposure
General exposures (open systems)	5 mg/m ³	0.875	**	Inhalation Exposure
Laboratory activities	0,5 mg/m ³	0.125	**	Inhalation Exposure
Bulk transfers + Dedicated facility	5 mg/m ³	0.875	**	Inhalation Exposure
Equipment cleaning and maintenance	5 mg/m ³	0.250	**	Inhalation Exposure
General exposures (closed systems) + Elevated temperature	3 mg/m ³	0.750	**	Inhalation Exposure
General exposures open batch process	3 mg/m ³	0.750	**	Inhalation Exposure
Bulk product storage	0,5 mg/m ³	0.088	**	Inhalation Exposure

** - The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

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

Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Health

Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Risk Management Measures are based on qualitative risk characterisation.

Available hazard data do not support the need for a DNEL to be established for other health effects. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.