Safety Data Sheet

according to Regulation (EC) 1907/2006 (REACH)

Revision date: 2020-02-20
Supercedes: 2019-02-14

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

1.1. Product identifier:

Product trade name:	CURE-RITE* 18 Powder
Company product number:	C18
REACH registration number:	01-2119537273-42-0000
Substance name:	4-((Morpholinothio)thioxomethyl)morpholine
Substance identification number:	EC 237-335-9
Other means of identification:	Morpholin-4-yl morpholine-4-carbodithioate

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

Uses:	See Annex for covered uses. Vulcanizing agent, cure accelerator for rubber.
Uses advised against:	Pulverization.

1.3. Details of the supplier of the safety data sheet:

Manufacturer/Supplier:	Emerald Performance Materials, LLC 1550 County Road 1450 N Henry, IL 61537 United States Telephone: +1-309-364-9499 1499 SE Tech Center Place, Suite 300 Vancouver, WA 98683 United States Telephone: +1-360-954-7100
EU Only Representative:	Penman Consulting bvba Avenue des Arts 10 B-1210 Brussels Belgium Telephone: +32 (0) 2 305 0698 email: pcbvba09@penmanconsulting.com
For further information about this SDS:	Email: product.compliance@emeraldmaterials.com

1.4. Emergency telephone number:

ChemTel (24 hours): 1-800-255-3924 (USA); +1-813-248-0585 (outside USA); 1-300-954-583 (Australia); 000-800-100-4086 (India).

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture:

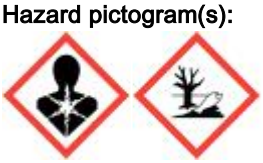
Product classification according to Regulation (EC) 1272/2008 (CLP) as amended:

Carcinogenicity, category 1B, H350
Hazardous to the aquatic environment, Chronic, category 2, H411

2.2. Label elements:

Product labeling according to Regulation (EC) 1272/2008 (CLP) as amended:

Hazard pictogram(s):



Signal word:

Danger

Hazard statements:

H350 May cause cancer.

H411 Toxic to aquatic life with long lasting effects.

Precautionary statements:

P201 Obtain special instructions before use.

P273 Avoid release to the environment.

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

P308+P313 IF exposed or concerned: Get medical advice/attention.

P391 Collect spillage.

Supplemental information: No Additional Information

Precautionary statements are listed according to the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Annex III and ECHA Guidance on Labelling and Packaging. Regulations in individual countries/regions may determine which statements are required on the product label. See product label for specifics.

2.3. Other hazards:

PBT/vPvB criteria: This product does not meet the PBT and vPvB classification criteria.

Other hazards: May form explosible dust-air mixture if dispersed.

See Section 11 for toxicological information.

SECTION 3: Composition/information on ingredients

3.1. Substance:

CAS-No.	Chemical Name	Weight%	Classification	H Statements
0013752-51-7	N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	98-100	Aquatic Chronic 2- Carc. 1B	H350-411

CAS-No.	Chemical Name	Weight%	REACH Registration No.	EC/List Number
0013752-51-7	N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	98-100	01-2119537273-42-0000	237-335-9

See Section 16 for full text of H (Hazard) statements (EC 1272/2008).

Amounts specified are typical and do not represent a specification. Remaining components are proprietary, non-hazardous, and/or present at amounts below reportable limits.

SECTION 4: First aid measures

4.1. Description of first aid measures:

General: If irritation or other symptoms occur or persist from any route of exposure, remove the affected individual from the area: see a physician/get medical attention.

Eye contact: Immediately flush eyes with plenty of clean water for an extended time, not less than fifteen (15) minutes. Flush longer if there is any indication of residual chemical in the eye. Ensure adequate flushing of the eyes by separating the eyelids with fingers and roll eyes in a circular motion. If eye irritation persists: Get medical advice/attention.

Skin contact: Immediately remove contaminated clothing and shoes. Wash the affected area with plenty of soap and water until no evidence of the chemical remains (at least 15-20 minutes). Launder clothing before reuse. If skin irritation occurs: Get medical advice/attention.

Inhalation: If affected, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a POISON CENTER or doctor/physician if you feel unwell. If any processing vapors, decomposition products or particulates are inhaled, remove individual(s) to fresh air. Provide protection before allowing reentry.

Ingestion: Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse out the mouth with water. Get medical attention immediately.

Protection of first aid responders: Wear proper personal protective clothing and equipment.

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

Irritation. Pre-existing skin problems may be aggravated by prolonged or repeated contact. Persons with sensitive airways (e.g., asthmatics) may react to airborne dust or vapors. See section 11 for additional information.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media:

Suitable: Use water spray, dry chemical, or foam. Carbon dioxide may be ineffective on larger fires due to a lack of cooling capacity which may result in reignition.

Unsuitable: Avoid hose streams or any method which will create dust clouds.

5.2. Special hazards arising from the substance or mixture:

Unusual fire/explosion hazards: Concentrated dust/air combinations may produce explosive conditions. As with all organic dusts, fine particles suspended in air in critical proportions and in the presence of an ignition source may ignite and/or explode. Dust may be sensitive to ignition by electrostatic discharge, electrical arcs, sparks, welding torches, cigarettes, open flame, or other significant heat sources. As a precaution, implement standard safety measures for handling finely divided organic powders. See Section 7 for suggested measures.

Hazardous combustion products: Irritating or toxic substances may be emitted upon burning, combustion or decomposition. See section 10 (10.6 Hazardous decomposition products) for additional information.

5.3. Advice for firefighters:

Avoid hose streams or any method which will create dust clouds. Wear self-contained breathing apparatus (SCBA) equipped with a full facepiece and operated in a pressure-demand mode (or other positive pressure mode) and approved protective clothing. Personnel without suitable respiratory protection must leave the area to prevent significant exposure to hazardous gases from combustion, burning or decomposition. In an enclosed or poorly ventilated area, wear SCBA during cleanup immediately after a fire as well as during the attack phase of firefighting operations.

See section 9 for additional information.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures:

See Section 8 for recommendations on the use of personal protective equipment. If spilled in an enclosed area, ventilate. Avoid raising powdered material due to explosion hazard. Use spark-proof and explosion-proof equipment. If inhalation of dust cannot be avoided, wear an approved particulate respirator. Personal Protective Equipment must be worn.

6.2. Environmental precautions:

Do not flush product into public sewer, water systems or surface waters.

6.3. Methods and material for containment and cleaning up:

Contain spill. Wear proper personal protective clothing and equipment. Using care to avoid dust generation, vacuum or sweep into a closed container for reuse or disposal. Use approved industrial vacuum cleaner for removal. Avoid causing dust. Place into labeled, closed container; store in safe location to await disposal. Change contaminated clothing and launder before reuse.

6.4. References to other sections:

See Section 8 for recommendations on the use of personal protection and Section 13 for waste disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling:

As with any chemical product, use good laboratory/workplace procedures. Do not get in eyes, on skin or clothing. Do not breathe dust, vapor, aerosol, mist or gas. Do not ingest, taste, or swallow. Wash thoroughly after handling this product. Always wash up before eating, smoking or using the facilities. Use under well-ventilated conditions. Avoid routine inhalation of dust of any kind. Exercise care when emptying containers, sweeping, mixing or doing other tasks which can create dust. Wash contaminated clothing before reuse. Provide eyewash fountains and safety showers in the work area. As a precaution to control dust explosion potential, implement the following safety measures:Eliminate ignition sources (e.g., sparks, static

buildup, excessive heat, etc.). In general, dust of organic materials is a static charge generator which may be ignited by electrostatic discharge, electrical arcs, sparks, welding torches, cigarettes, open flame, or other significant heat sources. Use spark-proof tools and equipment. Bond, ground and properly vent conveyors, dust control devices and other transfer equipment. Prohibit flow of polymer, powder or dust through non-conductive ducts, vacuum hoses or pipes, etc.; only use grounded, electrically conductive transfer lines when pneumatically conveying product. Good housekeeping and controlling of dusts are necessary for safe handling of product. Prevent accumulation of dust (e.g., well-ventilated conditions, promptly vacuuming spills, cleaning overhead horizontal surfaces, etc.).

7.2. Conditions for safe storage, including any incompatibilities:

Store cool and dry, under well-ventilated conditions. Store this material away from incompatible substances (see section 10). Do not store in open, unlabeled or mislabeled containers. Keep container closed when not in use. Do not reuse empty container without commercial cleaning or reconditioning. Empty container contains residual product which may exhibit hazards of product.

7.3. Specific end use(s):

Further information concerning special risk management measures: see annex of this safety data sheet (exposure scenarios).

SECTION 8: Exposure controls / personal protection

8.1. Control parameters:

Occupational exposure limits (OEL):

Chemical Name	EU OELV	EU IOELV	ACGIH - TWA/Ceiling	ACGIH - STEL
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	N/E	N/E	N/E	N/E

Chemical Name	UK WEL	Ireland OEL
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	N/E	N/E

N/E=Not established (no exposure limits established for the listed substances for listed country/region/organization).

Emerald Performance Materials recommended exposure threshold limit value for N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide is 0.1 mg/m3, 8-hour TWA. PNOS: ACGIH has recommended the following exposure limits for Particulates (insoluble or poorly soluble) not otherwise specified (PNOS): 10 mg/m3 TWA (inhalable particles), 3 mg/m3 TWA (respirable particles). Belgium: 3 mg/m3 TWA (alveolar fraction); 10 mg/m3 TWA (inhalable fraction). Germany MAK Values for dust: 1.5 mg/m3 MAK (respirable fraction); 4 mg/m3 MAK (inhalable fraction). Portugal: 10 mg/m3 TWA (inhalable fraction); 3 mg/m3 TWA (respirable fraction). Spain: 10 mg/m3 VLA-ED (inhalable fraction); 3 mg/m3 VLA-ED (respirable fraction).

Derived No Effect Levels (DNELs):

N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide

Population	Route	Acute (local)	Acute (systemic)	Long Term (local)	Long Term (systemic)
Workers	Inhalation	N/A	N/A	N/A	1,789 mg/m3
Workers	Dermal	N/A	N/A	N/A	0,204 mg/kg bw/day
General population	Dermal	N/E	N/E	N/E	N/E

Predicted No Effect Concentration (PNECs):

N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide

Compartment	PNEC
Freshwater	0,0016 mg/L
Freshwater sediment	0,00388 mg/kg dw
Marine water	0,00016 mg/L
Marine water sediment	0,000388 mg/kg dw
Intermittent releases	0,016 mg/L
Soil	0,00232 mg/kg dw
STP	10 mg/L
Oral	No potential for bioaccumulation

N/E=Not established; N/A=Not applicable (not required); bw=body weight; dw=dry weight; ww=wet weight.

8.2. Exposure controls:

Appropriate engineering controls: Always provide effective general and, when necessary, local exhaust ventilation to draw dust away from workers to prevent routine inhalation. Ventilation must be adequate to maintain the ambient workplace atmosphere below the exposure limit(s) outlined in the SDS. Eliminate ignition sources (e.g., sparks, static buildup, excessive

heat, etc.). Prohibit flow of powder or dust through non-conductive ducts, vacuum hoses, or pipes, etc. Bond, ground, and properly vent conveyors, dust control devices and other transfer equipment.

Individual protection measures, such as personal protective equipment:

Eye/face protection: Safety glasses or goggles required.

Hand protection: Avoid skin contact when mixing or handling the material by wearing impervious and chemical resistant gloves. In case of prolonged immersion or frequently repeated contact, gloves with breakthrough times greater than 480 minutes (protection class 6) are recommended. For brief contact or splash applications, gloves with breakthrough times of 30 minutes or greater are recommended (protection class 2 or greater). Suggested materials for protective gloves: Nitrile rubber, Neoprene, Polyvinyl alcohol (PVA), Viton. The protective gloves to be used must comply with the specifications of the EC directive 89/686/EEC and the resultant standard EN 374. Suitability and durability of a glove is dependent on usage (e.g. frequency and duration of contact, other chemicals which may be handled, chemical resistance of glove material and dexterity). Always seek advice of the glove supplier as to the most suitable glove material.

Skin and body protection: Use good laboratory/workplace procedures including personal protective clothing: labcoat, safety glasses and protective gloves.

Respiratory protection: In case of insufficient ventilation, wear suitable respiratory equipment. If inhalation of dust cannot be avoided, wear an approved particulate respirator.

Further information: Eyewash fountains and safety showers are recommended in the work area.

Environmental exposure controls: See Sections 6 and 12.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties:

Form:	Powder	**pH:**	Not Available
Appearance:	Off-white to yellow	**Relative density:**	1.3-1.4
Odour:	Slight	**Partition coefficient (n-octanol/water):**	1.65
Odour threshold:	Not Available	**% Volatile by weight:**	Not Available
Solubility in water:	0.127 g/L @ 20°C	**VOC:**	Not Available
Evaporation rate:	Not Available	**Boiling point °C:**	Not Applicable Decomposes before boiling
Vapour pressure:	0.00001153 hPa (25 °C)	**Boiling point °F:**	Not Applicable Decomposes before boiling
Vapour density:	Not Available	**Flash point:**	Not Applicable
Viscosity:	Not Available	**Autoignition temperature:**	275°C (527°F)
Melting point/Freezing point:	130-140°C (266-284°F)	**Flammability (solid, gas):**	May form combustible dust concentrations in air.
Oxidising properties:	Not oxidizing	**Flammability or explosive limits:**	LFL/LEL: Not Available
Explosive properties:	Not explosive		UFL/UEL: Not Available
Decomposition temperature:	Not Available	**Surface tension:**	

9.2. Other information:

Amounts specified are typical and do not represent a specification.

Dust combustibility data: N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE: The following characteristics apply to powder and are expected to apply to dust from pellets reduced to a powder:

-Minimum explosive concentration: 0.03 oz/ft3 (30 g/m3)
-Minimum ignition energy (dust cloud): 0.20 joules
-Maximum rate of pressure rise: 14,700 psi/sec @ 0.1 oz/ft3 (1,010 bars/sec @ 100 g/m3)
-Maximum pressure of explosion: 83 psig @ 0.5 oz/ft3 (5.7 bars-gauge @ 500 g/m3)
-Explosion severity ratio: 5.83 (severe)
-Deflagration Index, Kst (estimate): 355 bar m/sec
-Ignition sensitivity: Strong
-Volume resistivity: 1.01 x 10^14 ohm-cm
-National Electrical Code (NFPA 70): Group G dust.

SECTION 10: Stability and reactivity

10.1. Reactivity:

Reaction with nitrites, nitrates and/or other nitrosating agents may lead to the formation of nitrosamines.

10.2. Chemical stability:

This product is stable. Prolonged storage above 43 °C (109 °F) will initiate chemical changes resulting in loss of accelerator functionality.

10.3. Possibility of hazardous reactions:

Hazardous polymerization will not occur.

10.4. Conditions to avoid:

Avoid dust formation.

10.5. Incompatible materials:

Avoid contact with strong oxidizing agents. Avoid contact with nitrosating agents.

10.6. Hazardous decomposition products:

Carbon dioxide, carbon monoxide, hydrocarbons, oxides of nitrogen, and oxides of sulfur. May liberate morpholine vapor when heated above 266°F (130°C).

SECTION 11: Toxicological information

11.1. Information on toxicological effects:

Information on likely routes of exposure:

General: Caution must be exercised through the prudent use of protective equipment and handling procedures to minimize exposure. N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE: Possible cancer hazard - may cause cancer based on animal data.

Eyes: Solid particles on the eye (powder/dust) may cause pain and be accompanied by irritation.

Skin: May cause skin irritation.

Inhalation: Dust inhalation may cause respiratory irritation.

Ingestion: Ingestion may cause irritation.

Acute toxicity information: Not classified (based on available data, the classification criteria are not met). N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE (CURE-RITE* 18): Inhalation by rats of 164.4 mg of CURE-RITE* 18 dust per liter of air for one hour did not produce any compound related toxic effects or mortality.

Chemical Name	Inhalation LC50	Species	Oral LD50	Species	Dermal LD50	Species
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	>164.4 mg/L (1 hour, no mortalities)	Rat/ adult	>5000 mg/kg	Rat/ adult	>10000 mg/kg	Rabbit/ adult

Skin corrosion/irritation: Not classified (based on available data, the classification criteria are not met).

Chemical Name	Skin irritation	Species
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Non-irritant	Rabbit/ adult

Serious eye damage/irritation: Not classified (based on available data, the classification criteria are not met). N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE (CURE-RITE* 18): Eye irritation, rabbits: mild, reversible irritant.

Chemical Name	Eye irritation	Species
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Mild-slight irritant	Rabbit/ adult

Respiratory or skin sensitization: Not classified (based on available data, the classification criteria are not met).

Chemical Name	Skin sensitisation	Species

Chemical Name	Skin sensitisation	Species
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Non-sensitizer	Local Lymph Node Assay (OECD 429)

Carcinogenicity: May cause cancer - Category 1B. N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE (CURE-RITE* 18): CURE-RITE* 18 is a possible cancer hazard based on a two year feeding study in which rats developed urinary tract tumors. Dust exposure is the main concern. Inhalation and skin contact should be minimized. Only limited evidence of toxic effect occurred in groups of rats fed 0, 20, 60, 200, or 600 ppm of CURE-RITE* 18 in their daily diet for over two years. No tumors or other compound related effects occurred at the three lower exposure levels (20, 60 and 200 ppm). Effects to the high dose group (600 ppm) consisted of decreased body weight and a pronounced incidence of rales (noise in the lungs). No tissue damage was observed in the lungs of these animals. Microscopic tissue examination revealed an increased evidence of urinary tumors in the high dose rats. That the risk of tumor induction diminishes rapidly with dose is suggested by the presence of tumors only in the high dose (600 ppm) animals. The absence of any tumors at 200 ppm (10.2 mg/kg bw/day) or lower is important although a "no effect" or "safe" level cannot be set. To man, 200 ppm is equivalent to a workplace exposure of approximately 12 mg of CURE-RITE* 18 dust per m3 of air. Applying a 100 safety factor results in an exposure level of approximately 0.100 mg CURE-RITE* 18 per m3 of air. While a safety factor of 100 is more commonly used for nongenotoxic agents, we believe that such a level will significantly minimize any risk. This level can be achieved by good industrial hygiene practice, well ventilated conditions and by following the guidelines in this safety data sheet. Pellets should enable even lower exposure levels to be achieved.

Germ cell mutagenicity: Not classified (based on available data, the classification criteria are not met). N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE (CURE-RITE* 18): In Dominant Lethal assays, male rats fed CURE-RITE* 18 for 56 days were mated with females. Examination of the pregnant females showed that CURE-RITE* 18 did not cause mutations which were lethal to the unborn pups. In short-term in vitro mutagenic screens (microbial and mammalian cell tests), no mutagenic activity was found in the Ames test or the E. coli WP2 uvrA-assays. Cell transformation (BALB/3T3) was observed in only one of two different commercial samples tested. Mutagenic responses were observed in the Mouse Lymphoma L5178Y, E. coli pol A+/pol A- plate, and CHO chromosome aberration assays.

Reproductive toxicity: Not classified (based on available data, the classification criteria are not met). N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE (CURE-RITE* 18): No adverse effect on reproductive performance (mating, fertility, pup growth or pup viability) was observed when groups of male rats were administered 0, 60, 200, or 600 ppm in their diets for 56 days and then mated with females.

Specific target organ toxicity (STOT) - single exposure: Not classified (based on available data, the classification criteria are not met).

Specific target organ toxicity (STOT) - repeated exposure: Not classified (based on available data, the classification criteria are not met).

Aspiration hazard: Not classified (technical impossibility to obtain the data).

Other toxicity information: No additional information available.

SECTION 12: Ecological information

12.1. Toxicity:

Chemical Name	Species	Acute	Acute	Chronic
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Fish	LC50 9.12 mg/L (96 hours)	N/E	N/E
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Invertebrates	EC50 1.6 mg/L (48 hours)	N/E	N/E
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Algae	EC50 5.9 mg/L (72 hours)	N/E	NOEC 2.48 mg/L(72 hours)
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Micro-organisms	EC50 >1000 mg/L (3 hours)		

12.2. Persistence and degradability:

N-OXYDIETHYLENETHIOCARBAMYL-N'-OXYDIETHYLENESULFENAMIDE: Not readily biodegradable. This material is inherently biodegradable (OECD 301B). This material undergoes a moderate to rapid rate of hydrolysis under environmental conditions and rapid hydrolysis under acidic conditions.

Chemical Name	Biodegradation
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	Not readily biodegradable (OECD 301B)

12.3. Bioaccumulative potential:

Chemical Name	Bioconcentration Factor (BCF)	Log Kow
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	N/E	1.65

12.4. Mobility in soil:

High mobility in soil is expected.

Chemical Name	Mobility in soil (Koc/Kow)
N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide	18.3

12.5. Results of PBT and vPvB assessment:

This product does not meet the PBT and vPvB classification criteria.

12.6. Other adverse effects:

No additional information available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods:

Dispose of unused contents (incineration or landfill) in accordance with national and local regulations. Dispose of container in accordance with national and local regulations. Ensure the use of properly authorized waste management companies, where appropriate.

See Section 8 for recommendations on the use of personal protective equipment.

SECTION 14: Transport information

The information below is provided to assist in documentation. It may supplement the information on the package. The package in your possession may carry a different version of the label depending on the date of manufacture. Depending on inner packaging quantities and packaging instructions, it may be subject to specific regulatory exceptions.

14.1. UN number: UN3077

14.2. UN proper shipping name:

Environmentally hazardous substance, solid, n.o.s. (N-Oxydiethylenethiocarbamyl-N'-oxydiethylenesulfenamide)

14.3. Transport hazard class(es):

U.S. DOT hazard class: N/A
Canada TDG hazard class: N/A
Europe ADR/RID hazard class: 9
IMDG Code (ocean) hazard class: 9
ICAO/IATA (air) hazard class: 9

A "N/A" listing for the hazard class indicates the product is not regulated for transport by that regulation.

14.4. Packing group: III

14.5. Environmental hazards:

Marine pollutant: Marine Pollutant (IMDG code 2.9.3).

Hazardous substance (USA): Not Applicable

14.6. Special precautions for user:

Not Applicable

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code:

Not Applicable

Notes: For surface shipments within the United States: Not regulated.

SECTION 15: Regulatory information

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

Europe REACh (EC) 1907/2006: Applicable components are registered, exempt or otherwise compliant. REACh is only relevant to substances either manufactured or imported into the EU. Emerald Performance Materials has met its obligations under the REACh regulation. REACh information regarding this product is provided for informational purposes only. Each Legal Entity may have differing REACh obligations, depending on their place in the supply chain. For material manufactured outside of the EU, the importer of record must understand and meet their specific obligations under the regulation.

EU Authorizations and/or restrictions on use: Not Applicable

Other EU information: No Additional Information

National regulations: No Additional Information

Chemical inventories:

Regulation	Status
Australian Inventory of Chemical Substances (AICS):	Y
Canadian Domestic Substances List (DSL):	Y
Canadian Non-Domestic Substances List (NDSL):	N
China Inventory of Existing Chemical Substances (IECSC):	Y
European EC Inventory (EINECS, ELINCS, NLP):	Y
Japan Existing and New Chemical Substances (ENCS):	N
Japan Industrial Safety and Health Law (ISHL):	N
Korean Existing and Evaluated Chemical Substances (KECL):	N
New Zealand Inventory of Chemicals (NZIoC):	N
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Y
Taiwan Inventory of Existing Chemicals:	Y
U.S. Toxic Substances Control Act (TSCA) (Active):	Y

A "Y" listing indicates all intentionally added components are either listed or are otherwise compliant with the regulation. A "N" listing indicates that for one or more components: 1) there is no listing on the public inventory (or is not on the ACTIVE inventory for U.S. TSCA); 2) no information is available; or 3) the component has not been reviewed. A "Y" for New Zealand may mean that a qualified group standard may exist for the components in this product.

15.2. Chemical safety assessment:

A chemical safety assessment has been carried out for the substance or mixture.

SECTION 16: Other information

Hazard (H) Statements in the Composition section (Section 3):

H350	May cause cancer.
H411	Toxic to aquatic life with long lasting effects.

Reason for revision: Changes in Section(s): 1

Evaulation method for classification of mixtures: Not Applicable (substance)

Legend:

* : Trademark owned by Emerald Performance Materials, LLC.
ACGIH: American Conference of Governmental Industrial Hygienists
EU OELV: European Union Occupational Exposure Limit Value
EU IOELV: European Union Indicative Occupational Exposure Limit Value
N/A: Not Applicable
N/E: None Established
STEL: Short Term Exposure Limit
TWA: Time Weighted Average (exposure for 8-hour workday)

Users Responsibility/Disclaimer of Liability:

The information set forth herein is based on our current knowledge, and is intended to describe the product solely with respect to health, safety and the environment. As such, it must not be interpreted as a guarantee of any specific property of the product. As a result, the customer shall be solely responsible for deciding whether said information is suitable and beneficial.

Safety Data Sheet Preparer:

Product Compliance Department
Emerald Performance Materials, LLC
1499 SE Tech Center Place, Suite 300
Vancouver, WA 98683
United States

Annex

Exposure Scenarios

Substance information:

Name of substance: N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide.
EC# 237-335-9 / CAS# 13752-51-7
REACH Registration number: 01-2119537273-42-000

List of exposure scenarios:

ES1: Use as Laboratory Reagent.
ES2: Formulating.
ES3: Laboratory sampling - pilot plant.
ES4: Manufacture of Rubber Articles.
ES5: Manufacture of Tyres.

General remarks:

N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide (substance) is used as a vulcanizing agent in the manufacture of rubber articles and tyres. Once this substance is processed, it is no longer available as N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide. The exposure assessments cover the life cycle of the substance until the vulcanization reaction is complete. N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide is no longer available after the vulcanization reaction.
This substance can either be used "as such" or formulated into a preparation.
This substance is not manufactured in the European Union.
The substance is used in industrial settings only. Therefore an exposure assessment for professional and consumer exposure is not necessary.
The primary long term routes of industrial exposure are skin contact and inhalation. In an industrial setting, ingestion is not an anticipated route of exposure.
Short-term systemic exposures were not calculated due to the lack of short-term systemic effects.

Exposure scenario (1): Use as Laboratory Reagent

1. Exposure scenario (1)

Short title of the exposure scenario:

Use as Laboratory Reagent

List of use descriptors:

Sector of use category (SU): SU9
Product category (PC): PC21
Process category (PROC): PROC15
Environmental release category (ERC): ERC1

List of names of contributing worker scenarios and corresponding PROCs:

PROC15 Use as laboratory reagent. Use of substances at small scale laboratory (< 1 l or 1 kg present at workplace).

Name of contributing environmental scenario and corresponding ERCs:

ERC1 Manufacture of the substance.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

Product characteristics:	Concentration of substance: 100%. Physical state: solid.
Amounts used:	This information is not relevant for assessment of worker's exposure.
Frequency and duration of use/exposure:	Duration: >4 hours/day. Frequency: <=10 days/year.
Other given operational conditions affecting workers exposure:	Location: Indoor use. Domain: Industrial use.
Technical conditions and measures to control dispersion from source towards the worker:	Local exhaust ventilation: Yes (90% effectiveness).

Conditions and measures related to personal protection, hygiene and health evaluation:	Respiratory protection: Not required. Gloves: While gloves are not necessary to reach an RCR of <1, it is recommended they be worn as part of good laboratory practice.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Use Local Exhaust ventilation. Smoking, eating and drinking are prohibited at the workplace. Generally accepted standards of occupational hygiene are maintained. While gloves are not necessary to achieve an RCR <1, gloves are recommended as part of good industrial hygiene practice. Minimisation of manual phases/work tasks. Minimisation of splashes and spills. Avoidance of contact with contaminated tools and objects. Regular cleaning of equipment and work area. Training staff on good practice. Management/supervision in place to check that RMMs in place are being used correctly and Operational Conditions followed.
2.2 Control of environmental exposure	
Product characteristics:	Concentration of substance: 100%. Physical state: solid.
Amounts used:	Maximum daily use at a site: 1 kg/day. Maximum annual use at a site: 10 kg/year. Fraction of the main local source: 0.1.
Frequency and duration of use:	Emission days: 10 days/year. Intermittent release.
Environmental factors not influenced by risk management:	Flow rate of receiving surface water: >=18,000 m3/day (default).
Other given operational conditions affecting environmental exposure:	Industry category: 3: Chemical industry - chemicals used in synthesis. Use category: 53: Vulcanizing agents. Main category industrial use: III Non-dispersive. Extra details on use category: No extra details necessary. Emission tables: A3.3 (IC-specific), B3.2 (general table). Industrial use. Release fraction to air from process: 1E-05 (default). Release fraction to wastewater from process: 0.02 (default). Release fraction to soil from process: 1E-04 (default).
Technical conditions and measures at process level (source) to prevent release:	Fraction connected to sewer system: 80% (default).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Dry sludge application to agricultural soil: Yes (default).
Organisational measures to prevent/limit releases from site:	Fraction of EU tonnage used in region (private use): 10% (default).
Conditions and measures related to municipal sewage treatment plant:	Municipal Sewage Treatment Plant (STP): Yes (freshwater), No (marine assessment). Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town). Sewage Sludge Incineration: No (default). Concentration of chemical in untreated waste water: 1E-03 mg/L (EUSES output). Concentration of chemical (total) in the STP effluent: 9.91E-04 mg/L (EUSES output).
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Spills are cleaned immediately.

3. Exposure estimation and reference to its source

Health

Information for contributing scenario (1): PROC15

Assessment method: ECETOC TRA Worker v2.0 with modifications.

Exposure estimation:

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Dermal	0.00343 mg/kg bw/day	0.017	
Worker, long-term, local	Inhalation	0.500 mg/m3	0.28	

Environment

Information for contributing scenario (2): ERC1

Assessment method: EUSES v2.1 based on 10 EU sites.

Exposure estimation:

Compartment	PEC	RCR	Notes
Freshwater	0.0000991 mg/L	0.006	Intermittent release based on 10 days/year
Freshwater sediment	0.00024 mg/kg ww	0.06	
Marine water	0.00001 mg/L	0.06	
Marine water sediment	0.0000242 mg/kg ww	0.06	
Soil	0.000111 mg/kg ww	0.05	
STP	0.001 mg/L	0.0001	
Air	0.00000000000762 mg/m3	Not Available	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Health:	Indoor use, medium dustiness, LEV used, no respirator required. Duration of activity >4 hours. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Concentration of substance: Up to 100%.
Environment:	Intermittent release based on 10 days/year. Maximum daily use at a site: 1 kg/day.

Exposure scenario (2): Formulating

1. Exposure scenario (2)

Short title of the exposure scenario:

Formulating

List of use descriptors:

Sector of use category (SU): SU10
Product category (PC): PC32
Process category (PROC): PROC2, PROC3, PROC5, PROC14
Environmental release category (ERC): ERC2

List of names of contributing worker scenarios and corresponding PROCs:

Industrial setting.
PROC2 Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC5 Mixing or blending in batch processes. Covers mixing or blending of solid or liquid materials in the context of manufacturing or formulating sectors, as well as upon end use.
PROC14 Tabletting, compression, extrusion, pelletisation, granulation. This covers processing of mixtures and/or substances into a defined shape for further use.

Name of contributing environmental scenario and corresponding ERCs:

ERC2 Formulation into mixture.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

Product characteristics:	Concentration of substance: 100%. Physical state: solid.
Amounts used:	This information is not relevant for assessment of worker's exposure.
Frequency and duration of use/exposure:	Duration: >4 hours/day. Frequency: <=3 days/year.
Human factors not influenced by risk management:	PROC 2, 3: Not relevant. PROC 5, 14: Exposed skin surface: Gloves.
Other given operational conditions affecting workers exposure:	Location: Indoor use. Domain: Industrial use.
Technical conditions and measures to control dispersion from source towards the worker:	Local exhaust ventilation: Yes (90% effectiveness).
Conditions and measures related to personal protection, hygiene and health evaluation:	Respiratory protection: Not required. Gloves are implemented as an additional risk management measure. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Suitable gloves are: Nitrile rubber, Neoprene, Polyvinyl alcohol (PVA), Viton.

Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Use Local Exhaust ventilation. Chemical resistant protective gloves must be worn. Smoking, eating and drinking are prohibited at the workplace. Generally accepted standards of occupational hygiene are maintained. Minimisation of manual phases/work tasks. Minimisation of splashes and spills. Avoidance of contact with contaminated tools and objects. Regular cleaning of equipment and work area. Training staff on good practice. Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.
2.2 Control of environmental exposure	
Product characteristics:	Concentration of substance: Up to 100%. Physical state: solid.
Amounts used:	Maximum daily use at a site: 30 ton. Maximum annual use at a site: 100 tons/year. Fraction of the main local source: 0.1.
Frequency and duration of use:	Emission days: 3 days/year. Intermittent release.
Environmental factors not influenced by risk management:	Flow rate of receiving surface water: >=18,000 m3/day (default).
Other given operational conditions affecting environmental exposure:	Industry category: 11: Polymers industry. Use category: 53: Vulcanizing agents. Main category industrial use: III Multi-purpose equipment. Extra details on use category: Polymer processing, Thermoset resins: curing agents, cross-linking agents. Emission tables: A2.1 (general table), B2.8 (general table). Indoor use. Release fraction to air from process: 2.5E-03 (default). Release fraction to wastewater from process: 0.02 (default). Release fraction to soil from process: 1E-04 (default).
Technical conditions and measures at process level (source) to prevent release:	Fraction connected to sewer system: 80% (default).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Dry sludge application to agricultural soil: Yes (default).
Organisational measures to prevent/limit releases from site:	Fraction of EU tonnage used in region (private use): 10% (default).
Conditions and measures related to municipal sewage treatment plant:	Municipal Sewage Treatment Plant (STP): Yes (freshwater), No (marine assessment). Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town). Sewage Sludge Incineration: No (default). Concentration of chemical in untreated waste water: 0 mg/L (EUSES output). Concentration of chemical (total) in the STP effluent: 0 mg/L (EUSES output).
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Spills are cleaned immediately.

3. Exposure estimation and reference to its source

Health

Information for contributing scenario (1): PROC2, PROC3, PROC5, PROC14

Assessment method: ECETOC TRA Worker v2.0 with modifications. The RCR for dermal exposure was adjusted (0.1) to account for glove use.

Exposure estimation: Only highest figures are presented here.

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Dermal	0.0343 mg/kg bw/day	0.17	PROC14
Worker, long-term, local	Inhalation	0.500 mg/m3	0.28	PROC5

Environment

Information for contributing scenario (2): ERC2

Assessment method: EUSES v2.1 based on 10 EU sites.

Exposure estimation:

Compartment	PEC	RCR	Notes
Freshwater	0.0000698 mg/L	0.004	Intermittent release based on 3 days/year
Freshwater sediment	0.000169 mg/kg ww	0.04	
Marine water	0.00000677 mg/L	0.04	
Marine water sediment	0.0000164 mg/kg ww	0.04	
Soil	0.000149 mg/kg ww	0.06	
STP	0 mg/L	0	
Air	0.000019 mg/m3	Not Available	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Health:	Indoor use, medium dustiness, LEV used, no respirator required. Duration of activity >4 hours. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Exposed skin surface: Gloves. Concentration of substance: Up to 100%.
Environment:	Intermittent release based on 3 days/year. Maximum daily use at a site: 30 ton.

Exposure scenario (3): Laboratory sampling - pilot plant

1. Exposure scenario (3)

Short title of the exposure scenario:

Laboratory sampling - pilot plant

List of use descriptors:

Sector of use category (SU): SU10
Product category (PC): PC32
Process category (PROC): PROC9
Environmental release category (ERC): ERC2

List of names of contributing worker scenarios and corresponding PROCs:

Industrial setting.
PROC9 Transfer of substance or mixture into small containers (dedicated filling line, including weighing). Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage.

Name of contributing environmental scenario and corresponding ERCs:

ERC2 Formulation into mixture.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

Product characteristics:	Concentration of substance: 100%. Physical state: solid.
Amounts used:	This information is not relevant for assessment of worker's exposure.
Frequency and duration of use/exposure:	Duration: >4 hours/day. Frequency: <=10 days/year.
Other given operational conditions affecting workers exposure:	Location: Indoor use. Domain: Industrial use.
Technical conditions and measures to control dispersion from source towards the worker:	Local exhaust ventilation: Yes (90% effectiveness).
Conditions and measures related to personal protection, hygiene and health evaluation:	Respiratory protection: Not required. Gloves are implemented as an additional risk management measure. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Suitable gloves are: Nitrile rubber, Neoprene, Polyvinyl alcohol (PVA), Viton.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Use Local Exhaust ventilation. Chemical resistant protective gloves must be worn. Smoking, eating and drinking are prohibited at the workplace. Generally accepted standards of occupational hygiene are maintained. Minimisation of manual phases/work tasks. Minimisation of splashes and spills. Avoidance of contact with contaminated tools and objects. Regular cleaning of equipment and work area. Training staff on good practice. Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.

2.2 Control of environmental exposure

Product characteristics:	Concentration of substance: 100%. Physical state: solid.
Amounts used:	Maximum daily use at a site: 25 kg/day. Maximum annual use at a site 250 kg/year. Fraction of the main local source: 0.1.
Frequency and duration of use:	Emission days: 10 days/year. Intermittent release.
Environmental factors not influenced by risk management:	Flow rate of receiving surface water: >=18,000 m3/day (default).
Other given operational conditions affecting environmental exposure:	Industry category: 11: Polymers industry. Use category: 53: Vulcanizing agents. Main category industrial use: III Multi-purpose equipment. Extra details on use category: Polymer processing, Thermoset resins: curing agents, cross-linking agents. Emission tables: A2.1 (general table), B2.8 (general table). Indoor use. Release fraction to air from process: 2.5E-03 (default). Release fraction to wastewater from process: 0.02 (default). Release fraction to soil from process: 1E-04 (default).
Technical conditions and measures at process level (source) to prevent release:	Fraction connected to sewer system: 80% (default).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Dry sludge application to agricultural soil: Yes (default).
Organisational measures to prevent/limit releases from site:	Fraction of EU tonnage used in region (private use): 10% (default).
Conditions and measures related to municipal sewage treatment plant:	Municipal Sewage Treatment Plant (STP): Yes (freshwater), No (marine assessment). Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town). Sewage Sludge Incineration: No (default). Concentration of chemical in untreated waste water: 0 mg/L (EUSES output). Concentration of chemical (total) in the STP effluent: 0 kg/d (EUSES output).
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Spills are cleaned immediately.

3. Exposure estimation and reference to its source

Health

Information for contributing scenario (1): PROC9

Assessment method: ECETOC TRA Worker v2.0 with modifications. The RCR for dermal exposure was adjusted (0.1) to account for glove use.

Exposure estimation:

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Dermal	0.0686 mg/kg bw/day	0.34	
Worker, long-term, local	Inhalation	0.500 mg/m3	0.28	

Environment

Information for contributing scenario (2): ERC2

Assessment method: EUSES v2.1 based on 10 EU sites.

Exposure estimation:

Compartment	PEC	RCR	Notes
Freshwater	0.0000000174 mg/L	0.00001	Intermittent release based on 10 days/year
Freshwater sediment	0.000000423 mg/kg ww	0.0001	
Marine water	0.0000000169 mg/L	0.0001	
Marine water sediment	0.000000041 mg/kg ww	0.0001	
Soil	0.000000373 mg/kg ww	0.00006	
STP	0 mg/L	0	
Air	0.000000019 mg/m3	Not Available	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

4. Guidance to the Downstream User to evaluate whether he works inside the boundaries set by the ES	
Health:	Indoor use, medium dustiness, LEV used, no respirator required. Duration of activity >4 hours. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Concentration of substance: Up to 100%.
Environment:	Intermittent release based on 10 days/year. Maximum daily use at a site: 25 kg/day.

Exposure scenario (4): Manufacture of rubber articles

1. Exposure scenario (4)

Short title of the exposure scenario:

Manufacture of Rubber Articles

List of use descriptors:

Sector of use category (SU): SU11
Product category (PC): PC32
Process category (PROC): PROC3, PROC4, PROC5, PROC6, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC21, PROC24
Environmental release category (ERC): ERC6d

List of names of contributing worker scenarios and corresponding PROCs:

Industrial setting.
PROC3 Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC4 Chemical production where opportunity for exposure arises.
PROC5 Mixing or blending in batch processes. Covers mixing or blending of solid or liquid materials in the context of manufacturing or formulating sectors, as well as upon end use.
PROC6 Calendering operations. Processing of large surfaces at elevated temperature e.g. calendering of textile, rubber or paper.
PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities. Transfer includes loading, filling, dumping, bagging.
PROC9 Transfer of substance or mixture into small containers (dedicated filling line, including weighing). Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage.
PROC10 Roller application or brushing. This includes application of paints, coatings, removers, adhesives or cleaning agents to surfaces with potential exposure arising from splashes.
PROC13 Treatment of articles by dipping and pouring.
PROC14 Tabletting, compression, extrusion, pelletisation, granulation. This covers processing of mixtures and/or substances into a defined shape for further use.
PROC21 Low energy manipulation and handling of substances bound in/on materials or articles. Cover activities such as manual cutting, cold rolling or assembly/disassembly of material/article.
PROC24 High (mechanical) energy work-up of substances bound in /on materials and/or articles. Substantial thermal or kinetic energy applied to substance by e.g. hot rolling/forming, grinding, mechanical cutting, drilling or sanding, stripping.

Name of contributing environmental scenario and corresponding ERCs:

ERC6d Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article).

Further explanations:

N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide is used as a vulcanizing agent in the manufacture of rubber articles. This scenario covers both the manufacture of rubber articles using N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide as such (100%) or as part of a formulated product (25%). The manufacturing processes are the same regardless if the neat or formulated product is used; therefore, the same exposure scenario can be used for both. Releases of N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide are expected during the formulation of preparations and manufacturing of rubber articles and tyres mainly via wastewater.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

Product characteristics:	Concentration of substance: Up to 100%. Physical state: solid.
Amounts used:	This information is not relevant for assessment of worker's exposure.
Frequency and duration of use/exposure:	Duration: >4 hours/day. Frequency: <=220 days/year.
Other given operational conditions affecting workers exposure:	Location: Indoor use. Domain: Industrial use.
Technical conditions and measures to control dispersion from source towards the worker:	PROC3, PROC4, PROC5, PROC6, PROC9, PROC10, PROC13, PROC14, PROC21, PROC24: Local exhaust ventilation: Yes (90% effectiveness). PROC8b: Local exhaust ventilation: Yes (95% effectiveness).

Conditions and measures related to personal protection, hygiene and health evaluation:	Respiratory protection: Not required. Gloves are implemented as an additional risk management measure. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Suitable gloves are: Nitrile rubber, Neoprene, Polyvinyl alcohol (PVA), Viton.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Use Local Exhaust ventilation. Chemical resistant protective gloves must be worn. Smoking, eating and drinking are prohibited at the workplace. Generally accepted standards of occupational hygiene are maintained. Minimisation of manual phases/work tasks. Minimisation of splashes and spills. Avoidance of contact with contaminated tools and objects. Regular cleaning of equipment and work area. Training staff on good practice. Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.
2.2 Control of environmental exposure	
Product characteristics:	Concentration of substance: Up to 100%. Physical state: solid.
Amounts used:	Maximum daily use at a site: 0.45 ton/day. Maximum annual use at a site: 100 tons/year. Fraction of the main local source: 0.1.
Frequency and duration of use:	Emission days: 220 days/year. Continuous use/release.
Environmental factors not influenced by risk management:	Flow rate of receiving surface water: >=18,000 m3/day (default).
Other given operational conditions affecting environmental exposure:	Industry category: 11: Polymers industry. Use category: 53: Vulcanizing agents. Main category industrial use: III Non-dispersive. Extra details on use category: Polymer processing, Thermoset resins: curing agents, cross-linking agents. Emission tables: A3.11 (specific uses), B3.9 (general table). Indoor use. Release fraction to air from process: 2.5E-03 (ETRMA Factor Guidance). Release fraction to wastewater from process: 5E-05 (default). Release fraction to soil from process: 1E-05 (default).
Technical conditions and measures at process level (source) to prevent release:	Fraction connected to sewer system: 80% (default).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Dry sludge application to agricultural soil: Yes (default).
Organisational measures to prevent/limit releases from site:	Fraction of EU tonnage used in region (private use): 10% (default).
Conditions and measures related to municipal sewage treatment plant:	Municipal Sewage Treatment Plant (STP): Yes (freshwater), No (marine assessment). Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town). Sewage Sludge Incineration: No (default). Concentration of chemical in untreated waste water: 0 mg/L (EUSES output). Concentration of chemical (total) in the STP effluent: 0 mg/L (EUSES output).
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Spills are cleaned immediately.

3. Exposure estimation and reference to its source

Health

Information for contributing scenario (1): PROC3, PROC4, PROC5, PROC6, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC21, PROC24

Assessment method: ECETOC TRA Worker v2.0 with modifications. The RCR for dermal exposure was adjusted (0.1) to account for glove use.

Exposure estimation: Only highest figures are presented here.

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Dermal	0.137 mg/kg bw/day	0.67	PROC6, PROC10

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Inhalation	0.500 mg/m3	0.28	PROC4, PROC5, PROC6, PROC9, PROC10

Environment

Information for contributing scenario (2): ERC6d

Assessment method: EUSES v2.1 based on 10 EU sites.

Exposure estimation:

Compartment	PEC	RCR	Notes
Freshwater	0.0000085 mg/L	0.005	
Freshwater sediment	0.000021 mg/kg ww	0.005	
Marine water	0.000000838 mg/L	0.005	
Marine water sediment	0.00000203 mg/kg ww	0.005	
Soil	0.000174 mg/kg ww	0.075	
STP	0 mg/L	0	
Air	0.000019 mg/m3	Not Available	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Health:	Indoor use, medium dustiness, LEV used, no respirator required. Duration of activity >4 hours. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Concentration of substance: Up to 100%.
Environment:	Continuous use/release. Maximum daily use at a site: 0.45 ton/day.

Exposure scenario (5): Manufacture of Tyres

1. Exposure scenario (5)

Short title of the exposure scenario:

Manufacture of Tyres

List of use descriptors:

Sector of use category (SU): SU11

Product category (PC): PC32

Process category (PROC): PROC5, PROC8b, PROC9, PROC10, PROC14, PROC21

Environmental release category (ERC): ERC6d

List of names of contributing worker scenarios and corresponding PROCs:

Industrial setting.

PROC5 Mixing or blending in batch processes. Covers mixing or blending of solid or liquid materials in the context of manufacturing or formulating sectors, as well as upon end use.

PROC8b Transfer of substance or mixture (charging and discharging) at dedicated facilities. Transfer includes loading, filling, dumping, bagging.

PROC9 Transfer of substance or mixture into small containers (dedicated filling line, including weighing). Filling lines specifically designed to both capture vapour and aerosol emissions and minimise spillage.

PROC10 Roller application or brushing. This includes application of paints, coatings, removers, adhesives or cleaning agents to surfaces with potential exposure arising from splashes.

PROC14 Tabletting, compression, extrusion, pelletisation, granulation. This covers processing of mixtures and/or substances into a defined shape for further use.

PROC21 Low energy manipulation and handling of substances bound in/on materials or articles. Cover activities such as manual cutting, cold rolling or assembly/disassembly of material/article.

Name of contributing environmental scenario and corresponding ERCs:

ERC6d Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article).

Further explanations:

N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide is used as a vulcanizing agent in the manufacture of tyres. This scenario covers both the manufacture of tyres using N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide as such (100%) or as part of a formulated product (25%). The manufacturing processes are the same regardless if the neat or formulated product is used; therefore, the same exposure scenario can be used for both. Releases of N-oxydiethylenethiocarbamyl-N-oxydiethylenesulfenamide are expected during the formulation of preparations and manufacturing of rubber articles and tyres mainly via wastewater.

For further information on standardized use descriptors see the European Chemical Agency (ECHA) Guidance on information requirements and chemical safety assessment, Chapter R.12: Use descriptor system (http://guidance.echa.europa.eu/docs/guidance_document/information_requirements_r12_en.pdf).

2. Conditions of use affecting exposure

2.1 Control of workers exposure

Product characteristics:	Concentration of substance: Up to 100%. Physical state: solid.

Amounts used:	This information is not relevant for assessment of worker's exposure.
Frequency and duration of use/exposure:	Duration: >4 hours/day. Frequency: <=220 days/year.
Other given operational conditions affecting workers exposure:	Location: Indoor use. Domain: Industrial use.
Technical conditions and measures to control dispersion from source towards the worker:	PROC5, PROC9, PROC10, PROC14, PROC21: Local exhaust ventilation: Yes (90% effectiveness). PROC8b: Local exhaust ventilation: Yes (95% effectiveness).
Conditions and measures related to personal protection, hygiene and health evaluation:	Respiratory protection: Not required. Gloves are implemented as an additional risk management measure. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Suitable gloves are: Nitrile rubber, Neoprene, Polyvinyl alcohol (PVA), Viton.
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Use Local Exhaust ventilation. Chemical resistant protective gloves must be worn. Smoking, eating and drinking are prohibited at the workplace. Generally accepted standards of occupational hygiene are maintained. Minimisation of manual phases/work tasks. Minimisation of splashes and spills. Avoidance of contact with contaminated tools and objects. Regular cleaning of equipment and work area. Training staff on good practice. Management/supervision in place to check that RMMs in place are being used correctly and OCs followed.
2.2 Control of environmental exposure	
Product characteristics:	Concentration of substance: Up to 100%. Physical state: solid.
Amounts used:	Maximum daily use at a site: 0.45 ton/day. Maximum annual use at a site: 100 tons/year. Fraction of the main local source: 0.1.
Frequency and duration of use:	Emission days: 220 days/year. Continuous use/release.
Environmental factors not influenced by risk management:	Flow rate of receiving surface water: >=18,000 m3/day (default).
Other given operational conditions affecting environmental exposure:	Industry category: 11: Polymers industry. Use category: 53: Vulcanizing agents. Main category industrial use: III Non-dispersive. Extra details on use category: Polymer processing, Thermoset resins: curing agents, cross-linking agents. Emission tables: A3.11 (specific uses), B3.9 (general table). Indoor use. Release fraction to air from process: 2.5E-03 (default). Release fraction to wastewater from process: 5E-05 (default). Release fraction to soil from process: 1E-05 (default).
Technical conditions and measures at process level (source) to prevent release:	Fraction connected to sewer system: 80% (default).
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:	Dry sludge application to agricultural soil: Yes (default).
Organisational measures to prevent/limit releases from site:	Fraction of EU tonnage used in region (private use): 10% (default).
Conditions and measures related to municipal sewage treatment plant:	Municipal Sewage Treatment Plant (STP): Yes (freshwater), No (marine assessment). Size of municipal sewage system/treatment plant: >=2000 m3/day (standard town). Sewage Sludge Incineration: No (default). Concentration of chemical in untreated waste water: 0 mg/L (EUSES output). Concentration of chemical (total) in the STP effluent: 0 mg/L (EUSES output).
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply:	Spills are cleaned immediately.
3. Exposure estimation and reference to its source	

Health

Information for contributing scenario (1): PROC5, PROC8b, PROC9, PROC10, PROC14, PROC21

Assessment method: ECETOC TRA Worker v2.0 with modifications. The RCR for dermal exposure was adjusted (0.1) to account for glove use.

Exposure estimation: Only highest figures are presented here.

	Route	Exposure estimate	RCR	Notes
Worker, long-term, local	Dermal	0.137 mg/kg bw/day	0.67	PROC10
Worker, long-term, local	Inhalation	0.500 mg/m3	0.28	PROC5, PROC9, PROC10

Environment

Information for contributing scenario (2): ERC6d

Assessment method: EUSES v2.1 based on 10 EU sites.

Exposure estimation:

Compartment	PEC	RCR	Notes
Freshwater	0.0000085 mg/L	0.005	
Freshwater sediment	0.000021 mg/kg ww	0.005	
Marine water	0.000000838 mg/L	0.005	
Marine water sediment	0.00000203 mg/kg ww	0.005	
Soil	0.000174 mg/kg ww	0.075	
STP	0 mg/L	0	
Air	0.000019 mg/m3	Not Available	

RCR=Risk characterization ratio (PEC/PNEC or Exposure estimate/DNEL); PEC=Predicted environmental concentration.

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

Health:	Indoor use, medium dustiness, LEV used, no respirator required. Duration of activity >4 hours. Wear chemical resistant gloves (tested to EN 374) in combination with basic employee training. Concentration of substance: Up to 100%.
Environment:	Continuous use/release. Maximum daily use at a site: 0.45 ton/day.