

## 2-MERCAPTOETHANOL

### ChemWatch Review SDS

Chemwatch: 2966

Version No: 6.1.1.1

Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Chemwatch Hazard Alert Code: 3

Issue Date: 05/09/2018

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S.GHS.USA.EN

#### SECTION 1 Identification

##### Product Identifier

|                               |  |
|-------------------------------|--|
| Product name                  | 2-MERCAPTOETHANOL  |
| Chemical Name                 | 2-mercaptoethanol  |
| Synonyms                      | C2-H6-O-S; HSCH2CH2OH; ethanol, 2-mercapto-; 1-ethanol-2-thiol; ethylene glycol, monothio-; 2-hydroxy-1-ethanethiol; 2-hydroxyethyl mercaptan; mercaptoethanol; beta-mercaptoethanol; monothioethyleneglycol; 2-thioethanol; thioglycol; thiomonoglycol; USAF EK-4196; Emery 5791; 2-ME; thioethylene glycol; 112926 |
| Proper shipping name          | Thioglycol   |
| Chemical formula              | C2H6OS   |
| Other means of identification | Not Available  |
| CAS number                    | 60-24-2  |

##### Recommended use of the chemical and restrictions on use

|                          |   |
|--------------------------|---|
| Relevant identified uses | Enzyme reactivator in inhibited systems. A reducing agent in the fluorescent reaction of o-phthalaldehyde and amino-acids in alkaline media. Used to dissociate proteins. |
|--------------------------|---|

##### Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

|                         |   |
|-------------------------|---|
| Registered company name | Bio-Rad Laboratories  |
| Address                 | Level 5, 446 Victoria Rd Gladesville NSW 2111 Australia       |
| Telephone               | +61 2 9914 2800 1800 224 354                                  |
| Fax                     | +61 2 9914 2888   |
| Website                 | <a href="http://www.bio-rad.com/">http://www.bio-rad.com/</a> |
| Email                   | Sales.Australia@bio-rad.com                                   |

##### Emergency phone number

|                                   |               |
|-----------------------------------|---------------|
| Association / Organisation        | Not Available |
| Emergency telephone numbers       | Not Available |
| Other emergency telephone numbers | Not Available |

#### SECTION 2 Hazard(s) identification

##### Classification of the substance or mixture

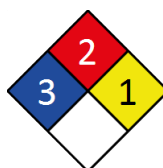
**Considered a Hazardous Substance by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200). Classified as Dangerous Goods for transport purposes.**

##### ChemWatch Hazard Ratings

|              | Min | Max |
|--------------|-----|-----|
| Flammability | 1   | 1   |
| Toxicity     | 3   | 3   |
| Body Contact | 3   | 3   |
| Reactivity   | 1   | 1   |
| Chronic      | 2   | 2   |

0 = Minimum  
1 = Low  
2 = Moderate  
3 = High  
4 = Extreme

##### NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

|                |  |
|----------------|--|
| Classification | Flammable Liquid Category 4, Acute Toxicity (Oral) Category 3, Acute Toxicity (Dermal) Category 3, Acute Toxicity (Inhalation) Category 4, Chronic Aquatic Hazard Category 1, Serious Eye Damage/Eye Irritation Category 1, Skin Sensitizer Category 1, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Skin Corrosion/Irritation Category 2 |
|----------------|--|

##### Label elements

## 2-MERCAPTOETHANOL

|                     |  |
|---------------------|--|
| Hazard pictogram(s) |  |
|---------------------|--|

|             |               |
|-------------|---------------|
| Signal word | <b>Danger</b> |
|-------------|---------------|

### Hazard statement(s)

|      |   |
|------|---|
| H227 | Combustible liquid.                                   |
| H301 | Toxic if swallowed.                                   |
| H311 | Toxic in contact with skin.                           |
| H332 | Harmful if inhaled.                                   |
| H410 | Very toxic to aquatic life with long lasting effects. |
| H318 | Causes serious eye damage.                            |
| H317 | May cause an allergic skin reaction.                  |
| H335 | May cause respiratory irritation.                     |
| H315 | Causes skin irritation.                               |

### Hazard(s) not otherwise classified

Not Applicable

### Precautionary statement(s) Prevention

|      |  |
|------|--|
| P210 | Keep away from heat/sparks/open flames/hot surfaces. - No smoking.         |
| P270 | Do not eat, drink or smoke when using this product.                        |
| P271 | Use only outdoors or in a well-ventilated area.                            |
| P280 | Wear protective gloves/protective clothing/eye protection/face protection. |

### Precautionary statement(s) Response

|                |  |
|----------------|--|
| P301+P310      | IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.  |
| P305+P351+P338 | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P330           | Rinse mouth.   |
| P362           | Take off contaminated clothing and wash before reuse.  |

### Precautionary statement(s) Storage

|           |  |
|-----------|--|
| P403+P235 | Store in a well-ventilated place. Keep cool. |
| P405      | Store locked up.                             |

### Precautionary statement(s) Disposal

|      |  |
|------|--|
| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|------|--|

## SECTION 3 Composition / information on ingredients

### Substances

| CAS No        | %[weight] | Name                     |
|---------------|-----------|--------------------------|
| 60-24-2       | >95       | <u>2-mercaptoethanol</u> |
| Not Available |           | may form                 |
| 7783-06-4     |           | <u>hydrogen sulfide</u>  |

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

### Mixtures

See section above for composition of Substances

## SECTION 4 First-aid measures

### Description of first aid measures

|             |  |
|-------------|--|
| Eye Contact | <p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> <li>▶ Immediately hold eyelids apart and flush the eye continuously with running water.</li> <li>▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.</li> <li>▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.</li> <li>▶ Transport to hospital or doctor without delay.</li> <li>▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.</li> </ul> |
|-------------|--|

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|                     |  |
|---------------------|--|
| <b>Skin Contact</b> | <p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> <li>▸ Quickly but gently, wipe material off skin with a dry, clean cloth.</li> <li>▸ Immediately remove all contaminated clothing, including footwear.</li> <li>▸ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.</li> <li>▸ Transport to hospital, or doctor.</li> </ul>   |
| <b>Inhalation</b>   | <ul style="list-style-type: none"> <li>▸ If fumes or combustion products are inhaled remove from contaminated area.</li> <li>▸ Lay patient down. Keep warm and rested.</li> <li>▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.</li> <li>▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.</li> <li>▸ Transport to hospital, or doctor, without delay.</li> </ul>   |
| <b>Ingestion</b>    | <ul style="list-style-type: none"> <li>▸ <b>If swallowed do NOT induce vomiting.</b></li> <li>▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.</li> <li>▸ Observe the patient carefully.</li> <li>▸ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.</li> <li>▸ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.</li> <li>▸ Seek medical advice.</li> <li>▸ Avoid giving milk or oils.</li> <li>▸ Avoid giving alcohol.</li> <li>▸ If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.</li> </ul> |

### Most important symptoms and effects, both acute and delayed

See Section 11

### Indication of any immediate medical attention and special treatment needed

Metabolised by alcohol dehydrogenase to mercaptoacetic acid and in vitro by cysteamine oxygenase to isethenic acid and isethionic acid. Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

For exposures involving sulfides and hydrogen sulfide (including gastric acid decomposition products of alkaline sulfides):

- Hydrogen sulfide anion produces its major toxic effect through inhibition of cytochrome oxidases.
- Symptoms include profuse salivation, nausea, vomiting and diarrhea. Central nervous effects may include giddiness, headache, vertigo, amnesia, confusion and unconsciousness. Tachypnoea, palpitations, tachycardia, arrhythmia, sweating, weakness and muscle cramps may also indicate overexposure.

Treatment involves:

- If respirations are depressed, application of artificial respiration, administration of oxygen (continue after spontaneous breathing is established).
- For severe poisonings administer amyl nitrite and sodium nitrite (as for cyanide poisoning) but omit sodium thiosulfate injection.
- Atropine sulfate (0.6 mg intramuscularly) may contribute symptomatic relief.
- Conjunctivitis may be relieved by installation of 1 drop of olive-oil in each eye and sometimes by 3 drops of epinephrine solution (1:1000) at frequent intervals. Occasionally local anesthetics and hot and cold compresses are necessary to control pain.
- Antibiotics at first hint of pulmonary infection.

[Gosselin et al, Clinical Toxicology of Commercial Products]

Hydrogen sulfide is metabolised by oxidation to sulfate, methylation and reaction with metallic ion- or disulfide containing proteins (principally cytochrome c oxidase). This latter reaction is associated with aerobic, cellular respiration and is largely responsible for the toxic effects

## SECTION 5 Fire-fighting measures

### Extinguishing media

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).

### Special hazards arising from the substrate or mixture

|                             |  |
|-----------------------------|--|
| <b>Fire Incompatibility</b> | ▸ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result |
|-----------------------------|--|

### Special protective equipment and precautions for fire-fighters

|                              |  |
|------------------------------|--|
| <b>Fire Fighting</b>         | <ul style="list-style-type: none"> <li>▸ Alert Fire Brigade and tell them location and nature of hazard.</li> <li>▸ Wear full body protective clothing with breathing apparatus.</li> <li>▸ Prevent, by any means available, spillage from entering drains or water course.</li> <li>▸ Use fire fighting procedures suitable for surrounding area.</li> </ul>  |
| <b>Fire/Explosion Hazard</b> | <ul style="list-style-type: none"> <li>▸ Combustible.</li> <li>▸ Slight fire hazard when exposed to heat or flame.</li> <li>▸ Heating may cause expansion or decomposition leading to violent rupture of containers.</li> <li>▸ On combustion, may emit toxic fumes of carbon monoxide (CO).</li> </ul> <p>Combustion products include:<br/>carbon dioxide (CO<sub>2</sub>)<br/>sulfur oxides (SO<sub>x</sub>)<br/>other pyrolysis products typical of burning organic material.<br/>May emit poisonous fumes.</p> |

## SECTION 6 Accidental release measures

### Personal precautions, protective equipment and emergency procedures

See section 8

### Environmental precautions

See section 12

## 2-MERCAPTOETHANOL

### Methods and material for containment and cleaning up

|                     |  |
|---------------------|--|
| <b>Minor Spills</b> | <p><b>WARNING: Never use dry, powdered hypochlorite or other strong oxidizer for mercaptan spills, as autoignition can occur.</b></p> <ul style="list-style-type: none"> <li>Remove all ignition sources.</li> <li>Clean up all spills immediately.</li> <li>Avoid breathing vapours and contact with skin and eyes.</li> <li>Control personal contact with the substance, by using protective equipment.</li> </ul> |
| <b>Major Spills</b> | <ul style="list-style-type: none"> <li>Clear area of personnel and move upwind.</li> <li>Alert Fire Brigade and tell them location and nature of hazard.</li> <li>Wear full body protective clothing with breathing apparatus.</li> <li>Prevent, by any means available, spillage from entering drains or water course.</li> </ul>   |

Personal Protective Equipment advice is contained in Section 8 of the SDS.

## SECTION 7 Handling and storage

### Precautions for safe handling

|                          |  |
|--------------------------|--|
| <b>Safe handling</b>     | <ul style="list-style-type: none"> <li><b>DO NOT allow clothing wet with material to stay in contact with skin</b></li> </ul> <p>The careful design and assembly of equipment is paramount to the control of mercaptan odors. Although careful planning reduces the chances for leaks developing in the system, it is important to be prepared to locate and stop small leaks promptly. It is recommended that a leak check be made prior to every run carried out under pressure in metal equipment with a mercaptan or hydrogen sulfide present.</p> <p>An effective method to obtain a leak-free system involves two steps:</p> <ol style="list-style-type: none"> <li>Charge the system with nitrogen gas or other inert, nontoxic gas to a pressure at least as high as will be used in practice, and check for a drop in pressure with time on a suitable gauge.</li> </ol> <ul style="list-style-type: none"> <li>Avoid all personal contact, including inhalation.</li> <li>Wear protective clothing when risk of exposure occurs.</li> <li>Use in a well-ventilated area.</li> <li>Prevent concentration in hollows and sumps.</li> </ul> |
| <b>Other information</b> | <ul style="list-style-type: none"> <li>Store in original containers.</li> <li>Keep containers securely sealed.</li> <li>Store in a cool, dry, well-ventilated area.</li> <li>Store away from incompatible materials and foodstuff containers.</li> </ul>   |

### Conditions for safe storage, including any incompatibilities

|                                |   |
|--------------------------------|---|
| <b>Suitable container</b>      | <p>Should be stored in glass-lined or polyethylene lined container or polyethylene lined containers to avoid contamination by metals.</p> <ul style="list-style-type: none"> <li>Lined metal can, lined metal pail/ can.</li> <li>Plastic pail.</li> <li>Polyliner drum.</li> <li>Packing as recommended by manufacturer.</li> </ul> <p>For low viscosity materials</p> <ul style="list-style-type: none"> <li>Drums and jerricans must be of the non-removable head type.</li> <li>Where a can is to be used as an inner package, the can must have a screwed enclosure.</li> </ul> <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):</p> <ul style="list-style-type: none"> <li>Removable head packaging;</li> <li>Cans with friction closures and</li> <li>low pressure tubes and cartridges</li> </ul> <p>may be used.</p>  |
| <b>Storage incompatibility</b> | <p>Avoid contact with alkali metals. Keep dry.</p> <p>2-Mercaptoethanol</p> <ul style="list-style-type: none"> <li>reacts violently with strong oxidisers</li> <li>is incompatible with strong acids, caustics, aliphatic amines, isocyanates</li> </ul> <p>Hydrogen sulfide (H<sub>2</sub>S):</p> <ul style="list-style-type: none"> <li>is a highly flammable and reactive gas</li> <li>reacts violently with strong oxidisers, metal oxides, metal dusts and powders, bromine pentafluoride, chlorine trifluoride, chromium trioxide, chromyl chloride, dichlorine oxide, nitrogen trichloride, nitryl hypofluorite, oxygen difluoride, perchloryl fluoride, phospham, phosphorus persulfide, silver fulminate, soda-lime, sodium peroxide</li> <li>is incompatible with acetaldehyde, chlorine monoxide, chromic acid, chromic anhydride, copper, nitric acid, phenyldiazonium chloride, sodium</li> <li>forms explosive material with benzenediazonium salts</li> <li>attacks many metals</li> </ul> <p>Flow or agitation of hydrogen sulfide may generate electrostatic charges due to low conductivity</p> <ul style="list-style-type: none"> <li>Avoid reaction with oxidising agents, bases and strong reducing agents.</li> </ul> |



+ X + X + + +

X — Must not be stored together  
O — May be stored together with specific preventions  
+ — May be stored together

## SECTION 8 Exposure controls / personal protection

### Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Continued...

## 2-MERCAPTOETHANOL

| Source  | Ingredient       | Material name                                       | TWA           | STEL          | Peak              | Notes               |
|---|------------------|---|---------------|---------------|-------------------|---------------------|
| US NIOSH Recommended Exposure Limits (RELs)           | hydrogen sulfide | Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen | Not Available | Not Available | 10 ppm / 15 mg/m3 | [10-minute]         |
| US OSHA Permissible Exposure Levels (PELs) - Table Z1 | hydrogen sulfide | Hydrogen sulfide                                    | Not Available | Not Available | Not Available     | See Table Z-2       |
| US OSHA Permissible Exposure Levels (PELs) - Table Z2 | hydrogen sulfide | Hydrogen sulfide                                    | Not Available | Not Available | 20 ppm            | (Z37.2-1966)        |
| US ACGIH Threshold Limit Values (TLV)                 | hydrogen sulfide | Hydrogen sulfide                                    | 1 ppm         | 5 ppm         | Not Available     | URT irr; CNS impair |

## Emergency Limits


| Ingredient        | Material name       | TEEL-1        | TEEL-2        | TEEL-3        |
|-------------------|---------------------|---------------|---------------|---------------|
| 2-mercaptoethanol | Mercaptoethanol, 2- | 0.6 ppm       | 3.5 ppm       | 29 ppm        |
| hydrogen sulfide  | Hydrogen sulfide    | Not Available | Not Available | Not Available |

| Ingredient        | Original IDLH | Revised IDLH  |
|-------------------|---------------|---------------|
| 2-mercaptoethanol | Not Available | Not Available |
| hydrogen sulfide  | 100 ppm       | Not Available |

## Occupational Exposure Banding

| Ingredient        | Occupational Exposure Band Rating  | Occupational Exposure Band Limit |
|-------------------|--|----------------------------------|
| 2-mercaptoethanol | E  | ≤ 0.1 ppm                        |
| Notes:            | Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health. |                                  |

## Exposure controls

|                                  |   |
|----------------------------------|---|
| Appropriate engineering controls | Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.<br>The basic types of engineering controls are:<br>Process controls which involve changing the way a job activity or process is done to reduce the risk.<br>Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.   |
| Personal protection              |   |
| Eye and face protection          | <ul style="list-style-type: none"><li>▶ Safety glasses with side shields.</li><li>▶ Chemical goggles.</li><li>▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task.</li></ul>   |
| Skin protection                  | See Hand protection below   |
| Hands/feet protection            | <ul style="list-style-type: none"><li>▶ Wear chemical protective gloves, e.g. PVC.</li><li>▶ Wear safety footwear or safety gumboots, e.g. Rubber</li></ul> <b>NOTE:</b> <ul style="list-style-type: none"><li>▶ The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.</li><li>▶ Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.</li></ul> The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.<br>The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.<br>Personal hygiene is a key element of effective hand care. |
| Body protection                  | See Other protection below  |
| Other protection                 | <ul style="list-style-type: none"><li>▶ Overalls.</li><li>▶ Eyewash unit.</li><li>▶ Barrier cream.</li><li>▶ Skin cleansing cream.</li></ul>  |

## Respiratory protection

Type AB Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

| Required minimum protection factor | Maximum gas/vapour concentration present in air p.p.m. (by volume) | Half-face Respirator | Full-Face Respirator |
|------------------------------------|--|----------------------|----------------------|
| up to 10                           | 1000   | AB-AUS / Class1      | -                    |
| up to 50                           | 1000   | -                    | AB-AUS / Class 1     |
| up to 50                           | 5000   | Airline *            | -                    |
| up to 100                          | 5000   | -                    | AB-2                 |
| up to 100                          | 10000  | -                    | AB-3                 |
| 100+                               |  |                      | Airline**            |

Continued...

\* - Continuous Flow \*\* - Continuous-flow or positive pressure demand

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO<sub>2</sub>), G = Agricultural chemicals, K = Ammonia(NH<sub>3</sub>), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- ▶ Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
  - ▶ The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
  - ▶ Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used
- For concentrations exceeding 10 ppm hydrogen sulfide or for unknown concentrations:
- ▶ Respirators should be equipped with pressure demand regulators and operated in pressure demand mode only. If airline units are used, a 5-minute egress bottle must also be carried.
  - ▶ Gas masks or other air-purifying respirators must never be used for H<sub>2</sub>S, due to the poor warning properties of the gas.
  - ▶ When exposure concentrations are unknown and respiratory protection is not used, personal H<sub>2</sub>S warning devices should be worn.
  - ▶ These devices should not be relied on to warn of life-threatening concentrations.
  - ▶ H<sub>2</sub>S rapidly fatigues the sense of smell; the rotten egg odour disappears quickly even where high concentrations are present.

## SECTION 9 Physical and chemical properties

### Information on basic physical and chemical properties

|   |  |  |                       |
|---|--|--|-----------------------|
| <b>Appearance</b>                                   | Clear colourless liquid with unpleasant smell; mixes with water (500 g/l). |  |                       |
| <b>Physical state</b>                               | Liquid   | <b>Relative density (Water = 1)</b>            | 1.114                 |
| <b>Odour</b>  | Not Available  | <b>Partition coefficient n-octanol / water</b> | -0.056 (25 C)         |
| <b>Odour threshold</b>                              | Not Available  | <b>Auto-ignition temperature (°C)</b>          | Not Available         |
| <b>pH (as supplied)</b>                             | Not Applicable   | <b>Decomposition temperature</b>               | Not Available         |
| <b>Melting point / freezing point (°C)</b>          | <-50   | <b>Viscosity (cSt)</b>                         | 3.81                  |
| <b>Initial boiling point and boiling range (°C)</b> | 157 (decomposes)   | <b>Molecular weight (g/mol)</b>                | 78.13                 |
| <b>Flash point (°C)</b>                             | 68   | <b>Taste</b>                                   | Not Available         |
| <b>Evaporation rate</b>                             | Not Available  | <b>Explosive properties</b>                    | Not Available         |
| <b>Flammability</b>                                 | Combustible.   | <b>Oxidising properties</b>                    | Not Available         |
| <b>Upper Explosive Limit (%)</b>                    | 18   | <b>Surface Tension (dyn/cm or mN/m)</b>        | Not Available         |
| <b>Lower Explosive Limit (%)</b>                    | 2.3  | <b>Volatile Component (%vol)</b>               | Negligible            |
| <b>Vapour pressure (kPa)</b>                        | 0.133 @ 20 C   | <b>Gas group</b>                               | Not Available         |
| <b>Solubility in water</b>                          | Miscible   | <b>pH as a solution (1%)</b>                   | 4.5-6 (500 g/l, 20 C) |
| <b>Vapour density (Air = 1)</b>                     | 2.69   | <b>VOC g/L</b>                                 | Not Available         |

## SECTION 10 Stability and reactivity

|   |  |
|---|--|
| <b>Reactivity</b>                         | See section 7  |
| <b>Chemical stability</b>                 | <ul style="list-style-type: none"> <li>▶ Unstable in the presence of incompatible materials.</li> <li>▶ Product is considered stable.</li> <li>▶ Hazardous polymerisation will not occur.</li> </ul> |
| <b>Possibility of hazardous reactions</b> | See section 7  |
| <b>Conditions to avoid</b>                | See section 7  |
| <b>Incompatible materials</b>             | See section 7  |
| <b>Hazardous decomposition products</b>   | See section 5  |

## SECTION 11 Toxicological information

### Information on toxicological effects

|                  |  |
|------------------|--|
| <b>Inhaled</b>   | <p>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful. The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Thiols (particularly ethyl mercaptan) produce lethargy or sleepiness. Exposure to high levels may result in nausea, vomiting, restlessness, muscle incoordination and/or paralysis, bluing of skin, depression of breathing, coma and death. Prolonged exposure may cause headache, nausea and ultimately loss of consciousness. Hydrogen sulfide poisoning can cause increased secretion of saliva, nausea, vomiting, diarrhoea, giddiness, headache, vertigo, memory loss, palpitations, heartbeat irregularities, weakness, muscle cramps, confusion, sudden collapse, unconsciousness and death due to paralysis of breathing (at levels above 300 parts per million). The "rotten egg" odour is not a good indicator of exposure since odour fatigue occurs and odour is lost at over 200 ppm. Low concentrations of 2-mercaptoethanol may produce headache and nausea. High concentrations may cause coughing, wheezing, shortness of breath, a burning sensation, laryngitis and vomiting. massive exposures may be fatal. Exposure to high concentrations may produce fever, nausea, vomiting, diarrhoea, blood in the urine, loss of voice, difficult breathing, headache, drunkenness, twitching, bluish skin colour, lung congestion, blood disorders, kidney damage, convulsions and coma.</p> |
| <b>Ingestion</b> | <p><b>Toxic effects</b> may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual. Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result.</p>   |

## 2-MERCAPTOETHANOL

|              |  |
|--------------|--|
|              | (ICSC13733)<br>In rats poisoned by oral administration, of 2-mercaptoethanol, pharmacotoxic signs included hypoactivity, ruffed fur, rapid breathing, muscular weakness, tremors, convulsions, prostration and cyanosis. Higher doses exerted a toxic effect within minutes, characteristic of central nervous system stimulation. Doses in the lethal range elicited marked depression<br>Doses of less than 480 mg/kg in mice produced slow and deepened respiration, retarded stimuli response, coma, and death in 1- 3 days. Doses exceeding 480 mg/kg produced intermittent tremors, reduced muscular coordination, long duration clonic convulsions, salivation, urination and death in 1-2 hours.   |
| Skin Contact | Skin contact with the material may produce toxic effects; systemic effects may result following absorption.<br>This material can cause inflammation of the skin on contact in some persons.<br>The material may accentuate any pre-existing dermatitis condition<br>Open cuts, abraded or irritated skin should not be exposed to this material<br>Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.<br>Pharmacotoxic signs in rabbits poisoned following skin absorption of 2-mercaptoethanol include depression, anorexia, salivation, tremors and laboured breathing  |
| Eye          | If applied to the eyes, this material causes severe eye damage.<br>Exposure to H <sub>2</sub> S may produce pain, blurred vision, and reaction to eyes which may be permanent in severe cases. There is usually redness of the eyes, discomfort on exposure to light, pain, and at higher concentrations blurred vision and injury to the eyes.  |
| Chronic      | Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.<br>Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.<br>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.<br>Long term low level exposure to hydrogen sulfide may produce headache, fatigue, dizziness, irritability and loss of sexual desire. These symptoms may also result when exposed to hydrogen sulfide at high concentration for a short period of time.<br>Repeated and long term exposure to mercaptans may result in damage to the lungs, kidneys and liver.<br>Animal testing shows that 2-mercaptoethanol can cause neuromuscular depression, low lymphocyte count, high neutrophil count and decreased oxygen consumption, as well as changes to weight, blood pressure, liver function and metabolism of proteins. |

|                   |   |                                 |
|-------------------|---|---------------------------------|
| 2-mercaptoethanol | <b>TOXICITY</b>   | <b>IRRITATION</b>               |
|                   | Dermal (rabbit) LD50: ~112-224 mg/kg <sup>[2]</sup>     | Eye (rabbit): 1 mg - SEVERE     |
|                   | Inhalation(Rat) LC50; 2 mg/L4hrs <sup>[2]</sup>         | Skin (rabbit): 10 mg/24h (open) |
|                   | Oral(Rat) LD50; 32-135 mg/kg <sup>[1]</sup>             |                                 |
| hydrogen sulfide  | <b>TOXICITY</b>   | <b>IRRITATION</b>               |
|                   | Inhalation(Mouse) LC50; =316.028 ppm4hrs <sup>[2]</sup> | Not Available                   |

**Legend:** 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. \* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

|                   |  |
|-------------------|--|
| 2-MERCAPTOETHANOL | Tremors, convulsion, excitement, spasticity, respiratory depression recorded. Genetic Toxicity: AMES - Negative; Mouse Lymphoma Forward Mutation Assay - Negative; In Vitro Sister Chromatid Exchange - Negative * *Chevron Philips MSDS Genetic toxicity: Results from a number of genotoxicity studies with microorganisms, mammalian cell culture and mammals are available. Taking into account all of the information, there is no indication that the substance is genotoxic. Reproductive toxicity: The results of animal studies gave no indication of a fertility impairing effect. The results were determined in a Screening test (OECD 421/422). Developmental toxicity/teratogenicity: A teratogenic potential cannot be excluded. The results were determined in a Screening test (OECD 421/422). Other information: Skin resorption hazard. ** BASF MSDS<br>The following information refers to contact allergens as a group and may not be specific to this product.<br>Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important.<br>Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia.<br>The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. |
|-------------------|--|

|                                   |   |                          |   |
|-----------------------------------|---|--------------------------|---|
| Acute Toxicity                    | ✓ | Carcinogenicity          | ✗ |
| Skin Irritation/Corrosion         | ✓ | Reproductivity           | ✗ |
| Serious Eye Damage/Irritation     | ✓ | STOT - Single Exposure   | ✓ |
| Respiratory or Skin sensitisation | ✓ | STOT - Repeated Exposure | ✗ |
| Mutagenicity                      | ✗ | Aspiration Hazard        | ✗ |

**Legend:** ✗ – Data either not available or does not fill the criteria for classification  
✓ – Data available to make classification

## SECTION 12 Ecological information

## Toxicity

|                   |                 |                           |                               |              |               |
|-------------------|-----------------|---------------------------|-------------------------------|--------------|---------------|
| 2-mercaptoethanol | <b>Endpoint</b> | <b>Test Duration (hr)</b> | <b>Species</b>                | <b>Value</b> | <b>Source</b> |
|                   | LC50            | 96                        | Fish                          | 37mg/L       | 2             |
|                   | EC50            | 48                        | Crustacea                     | 0.4mg/L      | 2             |
|                   | EC50            | 72                        | Algae or other aquatic plants | =12mg/L      | 1             |

Continued...



## 2-MERCAPTOETHANOL

|   |          |                    |           |             |        |
|---|----------|--------------------|-----------|-------------|--------|
|   | EC0      | 24                 | Crustacea | =0.781mg/L  | 1      |
|   | NOEC     | 504                | Crustacea | >0.063mg/L  | 2      |
| hydrogen sulfide  | Endpoint | Test Duration (hr) | Species   | Value       | Source |
|   | LC50     | 96                 | Fish      | 0.00143mg/L | 2      |
|   | EC50     | 48                 | Crustacea | 0.12mg/L    | 2      |
|   | NOEC     | 3960               | Fish      | 0.0004mg/L  | 5      |
| <b>Legend:</b> <i>Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data</i> |          |                    |           |             |        |

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

Environmental fate: 2-Mercaptoethanol may be released into the environment as a result of its production and use as solvent for dyestuffs, intermediate for producing dyestuffs, pharmaceuticals, and rubber chemicals among others.

Terrestrial fate: If released to soil, 2-mercaptoethanol is expected to be very highly mobile in soil. Volatilization of the compound from moist soil surfaces is not likely to occur based upon its physico-chemical properties but it is expected to volatilize from dry soil surfaces based upon its vapor pressure. Study shows that biodegradation is not a significant fate process of the compound in anoxic soil environments.

Sulfide ion is very toxic to aquatic life, threshold concentration for fresh or saltwater fish is 0.5ppm. The product therefore is very toxic to aquatic life. The major decomposition product, hydrogen sulfide, is damaging to vegetation at 5ppm for 24 hours

For Mercaptans:

Atmospheric Fate: Evaporation of the lower molecular to the atmosphere is expected to be an important fate process. Alkyl mercaptans are expected to exist primarily in the vapor-phase where they readily degrade, due to reactions with hydroxyl radicals.

Aquatic Fate: Evaporation is expected to be an important transport process for mercaptans in water.

Terrestrial Fate: Sorption to soil is thought to be low, however; the extent of sorption may be directly correlated to the level of organic material within different soil types.

For hydrogen sulfide:

Environmental Fate: Since hydrogen sulfide exists as a gas at atmospheric pressure, partitioning to the air is likely to occur after environmental release, where it may adhere to soil and plant foliage. The compound is also soluble in oil and water, and thus may also partition to surface water, groundwater, or moist soil. Hydrogen sulfide's solubility in pure water decreases as water temperature increases. Once hydrogen sulfide is dissolved in water, it will dissociate into bisulfide and sulfide ions; the ratio and concentrations of these ions will depend on the pH of the solution.

**DO NOT** discharge into sewer or waterways.

## Persistence and degradability

| Ingredient        | Persistence: Water/Soil | Persistence: Air |
|-------------------|-------------------------|------------------|
| 2-mercaptoethanol | LOW                     | LOW              |
| hydrogen sulfide  | LOW                     | LOW              |

## Bioaccumulative potential

| Ingredient        | Bioaccumulation      |
|-------------------|----------------------|
| 2-mercaptoethanol | LOW (BCF = 0.3)      |
| hydrogen sulfide  | LOW (LogKOW = 0.229) |

## Mobility in soil

| Ingredient        | Mobility           |
|-------------------|--------------------|
| 2-mercaptoethanol | HIGH (KOC = 1.325) |
| hydrogen sulfide  | LOW (KOC = 14.3)   |

## SECTION 13 Disposal considerations

## Waste treatment methods



|                              |   |
|------------------------------|---|
| Product / Packaging disposal | <ul style="list-style-type: none"><li>Containers may still present a chemical hazard/ danger when empty.</li><li>Return to supplier for reuse/ recycling if possible.</li></ul> Otherwise: <ul style="list-style-type: none"><li>If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.</li><li>Where possible retain label warnings and SDS and observe all notices pertaining to the product.</li></ul> Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. <p>A Hierarchy of Controls seems to be common - the user should investigate:</p> <ul style="list-style-type: none"><li>Reduction</li><li>Reuse</li><li>Recycling</li><li>Disposal (if all else fails)</li></ul> This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. <ul style="list-style-type: none"><li><b>DO NOT allow wash water from cleaning or process equipment to enter drains.</b></li><li>It may be necessary to collect all wash water for treatment before disposal.</li><li>In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.</li><li>Where in doubt contact the responsible authority.</li><li>Recycle wherever possible or consult manufacturer for recycling options.</li><li>Consult State Land Waste Authority for disposal.</li><li>Bury or incinerate residue at an approved site.</li><li>Recycle containers if possible, or dispose of in an authorised landfill.</li></ul> |
|------------------------------|---|



## 2-MERCAPTOETHANOL

## SECTION 14 Transport information

## Labels Required

|                  |   |
|------------------|---|
|                  |  |
| Marine Pollutant |  |

## Land transport (DOT)

|                              |                           |                |
|------------------------------|---------------------------|----------------|
| UN number                    | 2966                      |                |
| UN proper shipping name      | Thioglycol                |                |
| Transport hazard class(es)   | Class                     | 6.1            |
|                              | Subrisk                   | Not Applicable |
| Packing group                | II                        |                |
| Environmental hazard         | Environmentally hazardous |                |
| Special precautions for user | Hazard Label              | 6.1            |
|                              | Special provisions        | IB2, T7, TP2   |

## Air transport (ICAO-IATA / DGR)

|                              |   |                |
|------------------------------|---|----------------|
| UN number                    | 2966  |                |
| UN proper shipping name      | Thioglycol  |                |
| Transport hazard class(es)   | ICAO/IATA Class   | 6.1            |
|                              | ICAO / IATA Subrisk                                       | Not Applicable |
|                              | ERG Code  | 6L             |
| Packing group                | II  |                |
| Environmental hazard         | Environmentally hazardous                                 |                |
| Special precautions for user | Special provisions  | Not Applicable |
|                              | Cargo Only Packing Instructions                           | 662            |
|                              | Cargo Only Maximum Qty / Pack                             | 60 L           |
|                              | Passenger and Cargo Packing Instructions                  | 654            |
|                              | Passenger and Cargo Maximum Qty / Pack                    | 5 L            |
|                              | Passenger and Cargo Limited Quantity Packing Instructions | Y641           |
|                              | Passenger and Cargo Limited Maximum Qty / Pack            | 1 L            |

## Sea transport (IMDG-Code / GGVSee)

|                              |                    |                |
|------------------------------|--------------------|----------------|
| UN number                    | 2966               |                |
| UN proper shipping name      | THIOGLYCOL         |                |
| Transport hazard class(es)   | IMDG Class         | 6.1            |
|                              | IMDG Subrisk       | Not Applicable |
| Packing group                | II                 |                |
| Environmental hazard         | Marine Pollutant   |                |
| Special precautions for user | EMS Number         | F-A , S-A      |
|                              | Special provisions | Not Applicable |
|                              | Limited Quantities | 100 mL         |

## Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

## Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| Product name      | Group         |
|-------------------|---------------|
| 2-mercaptoethanol | Not Available |
| hydrogen sulfide  | Not Available |

Continued...

## 2-MERCAPTOETHANOL

## Transport in bulk in accordance with the ICG Code

| Product name      | Ship Type     |
|-------------------|---------------|
| 2-mercaptoethanol | Not Available |
| hydrogen sulfide  | Not Available |

## SECTION 15 Regulatory information

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

## 2-mercaptoethanol is found on the following regulatory lists

US DOE Temporary Emergency Exposure Limits (TEELs)  
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory  
US Toxicology Excellence for Risk Assessment (TERA) Workplace Environmental Exposure Levels (WEEL)  
US TSCA Chemical Substance Inventory - Interim List of Active Substances

## hydrogen sulfide is found on the following regulatory lists

US ACGIH Threshold Limit Values (TLV)  
US AIHA Workplace Environmental Exposure Levels (WEELs)  
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)  
US CWA (Clean Water Act) - List of Hazardous Substances  
US Department of Homeland Security (DHS) - Chemical Facility Anti-Terrorism Standards (CFATS) - Chemicals of Interest  
US DOE Temporary Emergency Exposure Limits (TEELs)  
US EPA Integrated Risk Information System (IRIS)  
US EPCRA Section 313 Chemical List  
US NIOSH Recommended Exposure Limits (RELs)  
US OSHA Permissible Exposure Levels (PELs) - Table Z1  
US OSHA Permissible Exposure Levels (PELs) - Table Z2  
US OSHA Permissible Exposure Limits - Annotated Table Z-1  
US OSHA Permissible Exposure Limits - Annotated Table Z-2  
US SARA Section 302 Extremely Hazardous Substances  
US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory  
US TSCA Chemical Substance Inventory - Interim List of Active Substances

## Federal Regulations

## Superfund Amendments and Reauthorization Act of 1986 (SARA)

## Section 311/312 hazard categories

|  |     |
|--|-----|
| Flammable (Gases, Aerosols, Liquids, or Solids)              | Yes |
| Gas under pressure   | No  |
| Explosive  | No  |
| Self-heating   | No  |
| Pyrophoric (Liquid or Solid)                                 | No  |
| Pyrophoric Gas   | No  |
| Corrosive to metal   | No  |
| Oxidizer (Liquid, Solid or Gas)                              | No  |
| Organic Peroxide   | No  |
| Self-reactive  | No  |
| In contact with water emits flammable gas                    | No  |
| Combustible Dust   | No  |
| Carcinogenicity  | No  |
| Acute toxicity (any route of exposure)                       | Yes |
| Reproductive toxicity  | No  |
| Skin Corrosion or Irritation                                 | Yes |
| Respiratory or Skin Sensitization                            | Yes |
| Serious eye damage or eye irritation                         | Yes |
| Specific target organ toxicity (single or repeated exposure) | No  |
| Aspiration Hazard  | No  |
| Germ cell mutagenicity                                       | No  |
| Simple Asphyxiant  | No  |
| Hazards Not Otherwise Classified                             | No  |

## US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

| Name                 | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
|----------------------|------------------------------------|---------------------------|
| Hydrogen sulfide H2S | 100                                | 45.4                      |

## State Regulations

## US. California Proposition 65

## 2-MERCAPTOETHANOL

None Reported

## National Inventory Status

| National Inventory                              | Status   |
|---|--|
| Australia - AIIC / Australia Non-Industrial Use | Yes  |
| Canada - DSL                                    | Yes  |
| Canada - NDSL                                   | No (2-mercaptoethanol; hydrogen sulfide)   |
| China - IECSC                                   | Yes  |
| Europe - EINEC / ELINCS / NLP                   | Yes  |
| Japan - ENCS                                    | Yes  |
| Korea - KECI                                    | Yes  |
| New Zealand - NZIoC                             | Yes  |
| Philippines - PICCS                             | Yes  |
| USA - TSCA                                      | Yes  |
| Taiwan - TCSI                                   | Yes  |
| Mexico - INSQ                                   | Yes  |
| Vietnam - NCI                                   | Yes  |
| Russia - ARIPS                                  | Yes  |
| <b>Legend:</b>                                  | <i>Yes = All CAS declared ingredients are on the inventory<br/>No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)</i> |

## SECTION 16 Other information

|               |            |
|---------------|------------|
| Revision Date | 05/09/2018 |
| Initial Date  | 12/07/2002 |

## SDS Version Summary

| Version | Issue Date | Sections Updated   |
|---------|------------|--|
| 5.1.1.1 | 29/06/2011 | Acute Health (inhaled), Acute Health (swallowed), Advice to Doctor, Chronic Health, Environmental, Exposure Standard, Personal Protection (Respirator) |

## Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

## Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average  
PC—STEL: Permissible Concentration-Short Term Exposure Limit  
IARC: International Agency for Research on Cancer  
ACGIH: American Conference of Governmental Industrial Hygienists  
STEL: Short Term Exposure Limit  
TEEL: Temporary Emergency Exposure Limit.  
IDLH: Immediately Dangerous to Life or Health Concentrations  
OSF: Odour Safety Factor  
NOAEL :No Observed Adverse Effect Level  
LOAEL: Lowest Observed Adverse Effect Level  
TLV: Threshold Limit Value  
LOD: Limit Of Detection  
OTV: Odour Threshold Value  
BCF: BioConcentration Factors  
BEI: Biological Exposure Index

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