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

Product information
Product Name: 2-Mercaptoethanol (BME)
Material: 1017944, 1068852, 1086428, 1086429, 1104362, 1093708, 1086428, 1021562, 1024822, 1021565, 1024821, 1021564, 1028369, 1033065, 1028386, 1028385, 1033120

Use: Chemical intermediate

Company: Chevron Phillips Chemical Company LP
Specialty Chemicals
10001 Six Pines Drive
The Woodlands, TX 77380

Emergency telephone:

Health: 866.442.9628 (North America)
1.832.813.4984 (International)

Transport:
CHEMTREC 800.424.9300 or 703.527.3887(int'l)
Asia: CHEMWATCH (+612 9186 1132) China: 0532 8388 9090
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)
Mexico CHEMTREC 01-800-681-9531 (24 hours)
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600
Argentina: +(54)-1159839431

Responsible Department: Product Safety and Toxicology Group
E-mail address: SDS@CPChem.com
Website: www.CPChem.com

SECTION 2: Hazards identification

Classification of the substance or mixture
This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

Classification
- Flammable liquids, Category 4
- Acute toxicity, Category 3, Oral
- Acute toxicity, Category 3, Inhalation
- Acute toxicity, Category 2, Dermal
- Skin irritation, Category 2

SDS Number: 100000013444
2-Mercaptoethanol (BME)

Version 2.0

Revision Date 2018-03-05

Serious eye damage, Category 1
Skin sensitization, Category 1
Reproductive toxicity, Category 2
Specific target organ systemic toxicity - repeated exposure, Category 2, Heart, Liver

Labeling

Symbol(s):

Signal Word: Danger

Hazard Statements:

H227: Combustible liquid.
H301 + H331: Toxic if swallowed or if inhaled.
H310: Fatal in contact with skin.
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H318: Causes serious eye damage.
H361: Suspected of damaging fertility or the unborn child.
H373: May cause damage to organs (Heart, Liver) through prolonged or repeated exposure.

Precautionary Statements:

Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P260 Do not breathe dust/fume/gas/mist/vapor/spray.
P262 Do not get in eyes, on skin, or on clothing.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing must not be allowed out of the workplace.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
P302 + P350 + P310 IF ON SKIN: Gently wash with plenty of soap and water. Immediately call a POISON CENTER or doctor/ physician.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P311 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
2-Mercaptoethanol (BME)

SECTION 3: Composition/information on ingredients

Synonyms:
- beta-Mercaptoethanol
- BME
- Thioglycol
- 2, Mercaptoethanol
- 2-Hydroxyethyl Mercaptan
- 2-Mercaptoethanol Pure

Molecular formula: HSCH2CH2OH

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Mercaptoethanol</td>
<td>60-24-2</td>
<td>99 - 100</td>
</tr>
</tbody>
</table>

SECTION 4: First aid measures

General advice: Move out of dangerous area. Consult a physician. Show this material safety data sheet to the doctor in attendance.

If inhaled: If unconscious, place in recovery position and seek medical advice. If symptoms persist, call a physician.

In case of skin contact: Take victim immediately to hospital. If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact: Small amounts splashed into eyes can cause irreversible tissue damage and blindness. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Continue rinsing eyes during transport to hospital. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
2-Mercaptoethanol (BME)

If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5: Firefighting measures

Flash point : 68.3 °C (154.9 °F)
Method: Tag closed cup

Autoignition temperature : 295 °C (563 °F) estimated

Suitable extinguishing media : Carbon dioxide (CO2).

Unsuitable extinguishing media : High volume water jet.

Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.

Fire and explosion protection : Do not spray on an open flame or any other incandescent material. Keep away from open flames, hot surfaces and sources of ignition.

SECTION 6: Accidental release measures

Personal precautions : Use personal protective equipment.

Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

SECTION 7: Handling and storage

Handling

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid
exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitization problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

Advice on protection against fire and explosion : Do not spray on an open flame or any other incandescent material. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers : Prevent unauthorized access. No smoking. Keep in a well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8: Exposure controls/personal protection

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Basis</th>
<th>Value</th>
<th>Control parameters</th>
<th>Note</th>
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</thead>
<tbody>
<tr>
<td>2-Mercaptoethanol</td>
<td>US WEEL</td>
<td>TWA</td>
<td>0.2 ppm.</td>
<td></td>
</tr>
</tbody>
</table>

Engineering measures

Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

Personal protective equipment

Respiratory protection : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as: Full-Face Supplied-Air Respirator. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into
consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Eye protection : Eye wash bottle with pure water.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate: Flame retardant protective clothing. Personal protection through wearing a tightly closed chemical protection suit and a self-contained breathing apparatus. Remove and wash contaminated clothing before re-use. Skin should be washed after contact. Footwear protecting against chemicals.

Hygiene measures : Avoid contact with skin, eyes and clothing. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product.

SECTION 9: Physical and chemical properties

Information on basic physical and chemical properties

Appearance

Form : Liquid
Physical state : Liquid
Color : Water white
Odor : Repulsive

Safety data

Flash point : 68.3 °C (154.9 °F)
Method: Tag closed cup

Lower explosion limit : 2.3 %(V)
Upper explosion limit : 18 %(V)

Oxidizing properties : No

Autoignition temperature : 295 °C (563 °F) estimated

Molecular formula : HSCH2CH2OH

Molecular weight : No data available
pH : Not applicable
Pour point : No data available
Freezing point : No data available

Boiling point/boiling range : 155 - 160 °C (311 - 320 °F)
Vapor pressure : 5.70 MMHG
**2-Mercaptoethanol (BME)**

**Relative density**: 1.12 at 15.6 °C (60.1 °F)

**Density**: 1.12 G/ML

**Partition coefficient: n-octanol/water**: Pow: 0.56

**Viscosity, dynamic**: 3.42 cP

**Relative vapor density**: 2.69 (Air = 1.0)

**Evaporation rate**: 1

**Percent volatile**: > 99 %

**SECTION 10: Stability and reactivity**

**Chemical stability**: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

**Possibility of hazardous reactions**

**Conditions to avoid**: Heat, flames and sparks.

**Materials to avoid**: May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

**Other data**: No decomposition if stored and applied as directed.

**SECTION 11: Toxicological information**

**Acute oral toxicity**

2-Mercaptoethanol: LD50: 98 - 168 mg/kg
Species: Rat
Sex: male and female
Method: OECD Test Guideline 401

**Acute inhalation toxicity**

2-Mercaptoethanol: LC50: 625 ppm
Exposure time: 4 h
Test atmosphere: gas

**Acute dermal toxicity**

2-Mercaptoethanol: LD50: ca. 112 - 224 mg/kg
Species: Rabbit
Sex: male and female
Skin irritation
2-Mercaptoethanol : Skin irritation

Eye irritation
2-Mercaptoethanol : Irreversible effects on the eye

Sensitization
2-Mercaptoethanol : The product is a skin sensitizer, sub-category 1A.

Repeated dose toxicity
2-Mercaptoethanol : Species: Rat, Male and female
                      Sex: Male and female
                      Application Route: oral gavage
                      Dose: 0.15, 50, 75 mg/kg
                      Exposure time: 7 wk
                      Number of exposures: daily
                      NOEL: 15 mg/kg
                      Lowest observable effect level: 50 mg/kg
                      Method: OECD Guideline 422
                      Target Organs: Heart, Liver

Reproductive toxicity
2-Mercaptoethanol : Species: Rat
                    Sex: male
                    Application Route: oral gavage
                    Dose: 0.15, 50, 75 mg/kg
                    Number of exposures: daily
                    Test period: 7 wks
                    Method: OECD Guideline 422
                    NOAEL Parent: 75 mg/kg

                    Species: Rat
                    Sex: female
                    Application Route: oral gavage
                    Dose: 0.15, 50, 75 mg/kg
                    Number of exposures: daily
                    Test period: 7 wks
                    NOAEL Parent: 15 mg/kg

Developmental Toxicity
2-Mercaptoethanol : Species: Rat
                    Application Route: oral gavage
                    Dose: 5, 15, 25 mg/kg/bw/d
                    Exposure time: GD 6-19
                    Number of exposures: daily
                    Test period: 20 d
                    Method: OECD Guideline 414
                    NOAEL Teratogenicity: 25 mg/kg
                    NOAEL Maternal: 25 mg/kg
                    Animal testing did not show any effects on fetal development.
2-Mercaptoethanol (BME)

SECTION 12: Ecological information

Toxicity to fish
2-Mercaptoethanol : LC50: 37 mg/l
Exposure time: 96 h
Species: Leuciscus idus (Golden orfe)

Toxicity to daphnia and other aquatic invertebrates
2-Mercaptoethanol : EC50: 0.4 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae
2-Mercaptoethanol : EC50: 19 mg/l
Exposure time: 72 h
Species: Desmodesmus subspicatus (green algae)
static test Method: OECD Test Guideline 201

M-Factor
2-mercaptoethanol : M-Factor (Acute Aquat. Tox.) 1

Toxicity to bacteria
2-Mercaptoethanol : EC50: 125 mg/l
Exposure time: 17 h
Growth rate
Species: Pseudomonas putida

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)
2-Mercaptoethanol : NOEC: 0.0624 mg/l
Exposure time: 21 d
### Bioaccumulation

<table>
<thead>
<tr>
<th>Species: Daphnia magna (Water flea)</th>
<th>Method: OECD Test Guideline 211</th>
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</thead>
</table>

| 2-Mercaptoethanol | This material is not expected to bioaccumulate. |

### Biodegradability

<table>
<thead>
<tr>
<th>2-Mercaptoethanol</th>
<th>Result: Not readily biodegradable. &lt; 10 % Method: OECD Test Guideline 301</th>
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</table>

### Ecotoxicology Assessment

#### Acute aquatic toxicity

<table>
<thead>
<tr>
<th>2-Mercaptoethanol</th>
<th>Very toxic to aquatic life.</th>
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#### Chronic aquatic toxicity

<table>
<thead>
<tr>
<th>2-Mercaptoethanol</th>
<th>Toxic to aquatic life with long lasting effects.</th>
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</thead>
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#### Results of PBT assessment

<table>
<thead>
<tr>
<th>2-Mercaptoethanol</th>
<th>Non-classified PBT substance, Non-classified vPvB substance</th>
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</thead>
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#### Additional ecological information

<table>
<thead>
<tr>
<th></th>
<th>Very toxic to aquatic life., Toxic to aquatic life with long lasting effects.</th>
</tr>
</thead>
</table>

### SECTION 13: Disposal considerations

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

- **Product**: The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.

- **Contaminated packaging**: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

### SECTION 14: Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous
2-Mercaptoethanol (BME)

Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

**US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)**
UN2966, THIOGLYCOL, 6.1, II

**IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)**
UN2966, THIOGLYCOL, 6.1, II, (68.3 °C), MARINE POLLUTANT, (THIOGLYCOL)

**IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)**
UN2966, THIOGLYCOL, 6.1, II

**ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))**
UN2966, THIOGLYCOL, 6.1, II, (D/E), ENVIRONMENTALLY HAZARDOUS, (THIOGLYCOL)

**RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))**
UN2966, THIOGLYCOL, 6.1, II, ENVIRONMENTALLY HAZARDOUS, (THIOGLYCOL)

**ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)**
UN2966, THIOGLYCOL, 6.1, II, ENVIRONMENTALLY HAZARDOUS, (THIOGLYCOL)

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

**SECTION 15: Regulatory information**

**National legislation**

**SARA 311/312 Hazards**
- Flammable (gases, aerosols, liquids, or solids)
- Acute toxicity (any route of exposure)
- Skin corrosion or irritation
- Serious eye damage or eye irritation
- Respiratory or skin sensitization
- Reproductive toxicity
- Specific target organ toxicity (single or repeated exposure)

**CERCLA Reportable Quantity**
- This material does not contain any components with a CERCLA RQ.
### 2-Mercaptoethanol (BME)

**Version 2.0**

<table>
<thead>
<tr>
<th>SARA 302 Reportable Quantity</th>
<th>This material does not contain any components with a SARA 302 RQ.</th>
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</thead>
<tbody>
<tr>
<td>SARA 302 Threshold Planning Quantity</td>
<td>This material does not contain any components with a section 302 EHS TPQ.</td>
</tr>
<tr>
<td>SARA 304 Reportable Quantity</td>
<td>This material does not contain any components with a section 304 EHS RQ.</td>
</tr>
<tr>
<td>SARA 313 Ingredients</td>
<td>This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.</td>
</tr>
</tbody>
</table>

**Clean Air Act**

**Ozone-Depletion Potential**: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

**US State Regulations**

**Pennsylvania Right To Know**: 2-Mercaptoethanol - 60-24-2

**California Prop. 65 Ingredients**: This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

**Notification status**

Europe REACH : On the inventory, or in compliance with the inventory
United States of America (USA) TSCA : On the inventory, or in compliance with the inventory
Canada DSL : On the inventory, or in compliance with the inventory

SDS Number:100000013444       12/14
SECTION 16: Other information

**NFPA Classification**
- Health Hazard: 3
- Fire Hazard: 2
- Reactivity Hazard: 0

**Further information**
- Legacy SDS Number: 26290

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

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

<table>
<thead>
<tr>
<th>Key or legend to abbreviations and acronyms used in the safety data sheet</th>
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</thead>
<tbody>
<tr>
<td><strong>ACGIH</strong></td>
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SDS Number: 100000013444
<table>
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<th>Symbol</th>
<th>Meaning</th>
<th>STEL</th>
<th>Description</th>
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<td>&gt;=</td>
<td>Greater Than or Equal To</td>
<td>STEL</td>
<td>Short-term Exposure Limit</td>
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<tr>
<td>IC50</td>
<td>Inhibition Concentration 50%</td>
<td>SARA</td>
<td>Superfund Amendments and Reauthorization Act.</td>
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<tr>
<td>IARC</td>
<td>International Agency for Research on Cancer</td>
<td>TLV</td>
<td>Threshold Limit Value</td>
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<td>IECSC</td>
<td>Inventory of Existing Chemical Substances in China</td>
<td>TWA</td>
<td>Time Weighted Average</td>
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<tr>
<td>ENCS</td>
<td>Japan, Inventory of Existing and New Chemical Substances</td>
<td>TSCA</td>
<td>Toxic Substance Control Act</td>
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<tr>
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<td>Korea, Existing Chemical Inventory</td>
<td>UVCB</td>
<td>Unknown or Variable Composition, Complex Reaction Products, and Biological Materials</td>
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<tr>
<td>&lt;=</td>
<td>Less Than or Equal To</td>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
</tr>
<tr>
<td>LC50</td>
<td>Lethal Concentration 50%</td>
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