Product Name: Monoethanolamine

Safety Data Sheet

1. PRODUCT IDENTIFICATION

Name: Monoethanolamine
Synonyms: 2-hydroxyethylamine, 2-amino-1-ethanol, 1-amino-2-hydroxyethanol, 2-aminoethanol, MEA
CAS#: 141-43-5
Europe EC#: 205-483-3
Product Uses: agricultural chemicals, cleaners, polishes, cosmetics, corrosion inhibitor, H₂S removal from natural gas

2. HAZARDS

Quick Guide: combustible liquid, may be corrosive to skin & eyes; decomposition products may be toxic

Canada – WHMIS
Key:
B 3, E
B 2 – Flash Point <38°C, B 3 – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, D 2 – Chronic Toxicity
C – Oxidising Substance, E – Corrosive, F – Reactive Substance

U.S.A. – HMIS
Key:
Health – 3, Fire – 2, Reactivity – 1
0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. COMPOSITION

<table>
<thead>
<tr>
<th>%</th>
<th>TWAEV/TLV mg/m³</th>
<th>LD₅₀ (mg/kg) ORAL</th>
<th>LD₅₀ (mg/kg) SKIN</th>
<th>LC₅₀ ppm INHALATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoethanolamine</td>
<td>&gt;99%</td>
<td>3 / 7.5</td>
<td>620</td>
<td>1025</td>
</tr>
<tr>
<td>Diethanolamine</td>
<td>0.1-0.4%</td>
<td>0.5 / 2</td>
<td>680</td>
<td>8400</td>
</tr>
</tbody>
</table>

4. FIRST AID

SKIN: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
INHALATION: Remove from contaminated area promptly. CAUTION: Rescuer must not endanger himself! If breathing stops, administer artificial respiration and seek medical aid promptly.
INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim’s head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. FIRE FIGHTING & FLAMMABILITY

Flash Point: 86°C / 186°F (closed cup)
Autoignition Temperature: 410°C / 770°F
Flammable Limits: 3.0% – 23.5%
Combustion Products: carbon monoxide, nitrogen oxides, ammonia, hydrogen cyanide, nitriles, isocyanates, nitrosamines, formaldehyde & other products
Firefighting Precautions: alcohol-resistant foam, dry chemical, water fog or spray; firefighters must wear SCBA
Static Charge Accumulation: cannot accumulate a static charge

Please ensure that this MSDS is given to, and explained to people using this product.
6. **ACCIDENTAL RELEASE MEASURES**

Leak Precaution: dyke to control spillage and prevent environmental contamination
Handling Spill: ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, shovel & store in closed containers for recycling or disposal

7. **HANDLING & STORAGE**

Store above 15°C (60°F), in a dry environment, away from sources of ignition, heat, oxidising agents & other substances listed in Part 10.

On exposure to air, this product may oxidise or react with atmospheric CO₂ to form unstable compounds. Ensure that containers are full and tightly sealed. Empty containers may contain a flammable / explosive vapour. Always ensure that containers, whether empty or full, or part full, are tightly sealed unless in use.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with organic vapour cartridge.

Never cut, drill, weld or grind on or near this container. Avoid all contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

8. **EXPOSURE CONTROL & PERSONAL PROTECTION**

- **Ontario TWAEV**: 3ppm / 7.5mg/m³
- **Ontario STEV**: 6ppm / 15mg/m³
- **ACGIH TLV**: 3ppm / 7.5mg/m³
- **OSHA PEL**: 3ppm / 6mg/m³

**Ventilation**: mechanical ventilation may be required to maintain airborne titre below regulated limits; depending on handling procedures; if a respirator is (occasionally) used, it must contain an organic vapour cartridge

**Hands**: nitrile, butyl, or neoprene gloves recommended – *consult supplier to confirm suitability or find substitutes*

**Eyes**: safety glasses with side shields & face shield – *always protect the eyes*

**Clothing**: wear impermeable (above) apron, boots, hat & long sleeves if there is any danger of splashing,

9. **PHYSICAL PROPERTIES**

**Odour & Appearance**: clear, colourless viscous, hygroscopic liquid with a mild ammonia (fishy) odour

**MEA yellows on exposure to air, ultraviolet or heat, darkening to brown in time**

**Odour Threshold**: 2-5ppm

**Vapour Pressure**: 0.4mmHg / 0.053kPa (25°C / 77°F)

**Evaporation Rate (Butyl Acetate = 1)**: not known – slower than mineral spirits

**Vapour Density (air = 1)**: 2.1

**Boiling Range**: 171°C / 340°F

**Melting Point**: 10.5°C / 51°F – *supercools readily; may take days to freeze @ -10°C*

**Specific Gravity**: 1.018 (20/20°C)

**Water Solubility**: complete

**Also soluble in**: most organic solvents; limited solubility in aromatic or aliphatic hydrocarbons

**Viscosity**: 19centipoise (25°C / 77°F)

**pH**: 11.7 (1 Molar solution ~6%)

**Conversion Factor**: 1ppm = 2.49mg/m³

**Molecular Weight**: 61grams per mole

10. **REACTIVITY**

**Dangerously Reactive With**: strong oxidising agents

**Also Reactive With**: acids or alkalis lowers decomposition temperature (*below*); CO₂ to form unstable carbamates

**Stability**: stable; will not polymerize

**Decomposes in Presence of**: above 200°C; self-sustaining decomposition above 250°C

**Decomposition Products**: none apart from Hazardous Combustion Products

**Sensitive to Mechanical Impact**: no
11. TOXICITY

Effects, Acute Exposure
Skin Contact severely irritating skin; may be corrosive if contact is prolonged
Skin Absorption yes; however, no toxic effects expected by this route
Eye Contact corrosive; may cause permanent damage
Inhalation vapour/mist likely to be irritating; may cause laboured breathing, wheezing & pulmonary oedema; symptoms may only develop after 24 hours or longer
Ingestion corrosive; burns mouth, throat, stomach pain; vomiting – not a route of industrial exposure

Effects, Chronic Exposure
General prolonged exposure to vapour/mist can cause bronchitis; prolonged or repeated exposure to low concentrations may cause dermatitis & skin cracking
Sensitising not a respiratory sensitisrer in humans or animals; there have been a very few human cases of skin sensitisation in people working with cutting fluids containing MEA
Carcinogen/Tumorigen not listed as a tumorigen or a carcinogen in humans or animals; there is a slight, statistically insignificant excess of stomach & oesophageal cancer in people working with MEA
Reproductive Effect no known effect in humans or animals
Mutagen no known effect on humans or animals
Synergistic With not known
LD₅₀ (oral) 1515–1725, 1970, 2140–2740, 3320mg/kg (rat), 700–1475mg/kg (mouse), 620 & 820mg/kg (guinea pig), 1000mg/kg (rabbit),
LD₅₀ (skin) 1025mg/kg (rabbit)
LC₅₀ (inhalation) >1212ppm (mouse)

12. ECOLOGICAL INFORMATION

Bioaccumulation highly water soluble & readily metabolised, so cannot bioaccumulate
Biodegradation biodegrades readily in the presence of oxygen; var. tests: 97% in 4 days, 62% in 28 days, 92% in 28 days, 80% in 19 days, 80–90% in 26 days & others
Abiotic Degradation reacts with atmospheric hydroxyl radicals; estimated ½-life in air is 11 hours & 27 hours (2 tests)
Mobility in soil, water water soluble; mobile in soil & water; but expected to become a cation & may adsorb strongly to soil
Aquatic Toxicity LC₅₀ (Fish, 96hr) 227 & 2070mg/litre (Pimephales promelas); 3680 & >5000mg/litre (Brachydanio rerio), 170 & 190mg/litre (Carassius auratus), 337mg/litre (Gambusia affinis), 330mg/litre (Lepomis macrochirus), 150mg/litre (Oncorhynexus mykiss)
EC₅₀ (Crustacea, 48hr) 65mg/litre (Daphnia magna), 120 & 140mg/litre (Daphnia magna, 24hr)
EC₅₀ (Algae) 15mg/litre (Scenedesmus subspicatus), 70mg/litre (“other algae”)
EC₅₀ (Bacteria) 110mg/litre (Pseudomonas putida), 13.7mg/litre (Photobacterium phosphoreum)

13. DISPOSAL

Waste Disposal do not flush to sewer, recycle solvent if possible, if local regulations permit, may be put in sanitary landfill, may be incinerated in approved facility
Containers Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use.
Pails must be vented and thoroughly dried prior to crushing and recycling.
IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years.
Never cut, drill, weld or grind on or near this container, even if empty

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14. TRANSPORT CLASSIFICATION

<table>
<thead>
<tr>
<th>Country</th>
<th>PIN</th>
<th>Shipping Name</th>
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<tbody>
<tr>
<td>Canada TDG</td>
<td>PIN</td>
<td>Shipping Name</td>
<td>2491</td>
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<tr>
<td>AND</td>
<td>Shipping Name</td>
<td>ethanolamine or ethanolamine solution</td>
<td></td>
</tr>
<tr>
<td>U.S.A. 49 CFR</td>
<td>Class &amp; Packing Group</td>
<td>8 (III)</td>
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<tr>
<td>Marine Pollutant</td>
<td>not a marine pollutant</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

EMERGENCY INFORMATION

<table>
<thead>
<tr>
<th>Country</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Call CANUTEC (collect) (613) 996-6666</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>Call CHEMTREC (800) 424-9300</td>
</tr>
</tbody>
</table>

15. REGULATIONS

Canada DSL on inventory
U.S.A. TSCA on inventory
Europe EINECS on inventory

Europe Classification Corrosive

Europe Risk Phrases
R: 20/21/22, 34 – Harmful by inhalation, in contact with skin & if swallowed. Causes burns.

Europe Safety Phrases
S: 26, 36/37/39, 45 – In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately

Immediately Dangerous to Life or Health: 30 ppm

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 3 ppm (6 mg/cu m). Vacated 1989 OSHA PEL TWA 3 ppm (8 mg/cu m); STEL 6 ppm (15 mg/cu m) is still enforced in some states.

NIOSH Recommendations: Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 3 ppm (8 mg/cu m). Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 6 ppm (15 mg/cu m).

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 3 ppm; 15 min Short Term Exposure Limit (STEL): 6 ppm.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. Ethanolamines are produced, as an intermediate or a final product, by process units covered under this subpart. /Ethanolamines/

FIFRA Requirements: As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether they are eligible for reregistration. In addition, all pesticides must meet the new safety standard of the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA ’88 were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern and List D pesticides of less concern. 2-Aminoethanol is found on List D. Case No: 4032; Pesticide type: Fungicide, antimicrobial; Case Status: No products containing the pesticide are actively registered. Therefore, we are characterizing the case as "cancelled." Under FIFRA, pesticide producers may voluntarily cancel their registered products. EPA also may cancel pesticide registrations if registrants fail to pay required fees or make/improve certain reregistration commitments, or if EPA reaches findings of unreasonable adverse effects.: Active ingredient (AI): 2-Aminoethanol; AI Status: The active ingredient is no longer contained in any registered products. Thus, we characterize it as "cancelled." Active Ingredients with Recent Production Pending Cancellation of all Products for Non-payment of 1990 Registration Fees: Ethanolamine (CAS 141-43-5). Use: disinfectant/antimicrobial uses. Year last produced: 1989. Registration N. 058018-00001. Product Name: Pro Way Brand Reaclean Spray Concentrate. /From Table 2/

FDA Requirements: Ethanolamine is an indirect food additive for use only as a component of adhesives.

16. OTHER INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.

Preparation Date: December 2003 Revision Date: December 2006, November 2009, November 2012

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