Established in 1981
megaloid laboratories limited
2221 Ninth Line | Oakville, ON L6H 7G7
Phone: 905-337-7411 | Fax: 905-337-1686
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Material Safety Data for: Diethanolamine

1. PRODUCT INDENTIFICATION

Name	**N,N-diethanolamine**
Synonyms	**2,2-dihydroxydiethylamine, 2,2-iminodiethanol and others**
CAS#	**111-42-2 (+ *water*)**
Europe EC#	**203-868-0 (+ *water*)**
Product Uses	**acid & H_2S removal from natural gas & other refinery gases; corrosion inhibitor in machining fluids; detergent, shampoo, & cosmetic ingredient, etc.**

2. INGREDIENTS

	%	TWAEV / TLV mg/m^3	LD_{50} ORAL	(mg/kg) SKIN	LC_{50} ppm INHALATION
Diethanolamine	100%	0.46 / 2 (skin)	>680	>8400	not known

3. (a) HAZARDS SUMMARY

Hazards, Quick Guide: severe eye irritant; decomposes above 200°C to create highly toxic products

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

3. (b) HAZARDS – TOXICITY

Effects, Acute Exposure

Skin Contact	irritating, may damage if left in contact with skin for hours
Skin Absorption	yes, however, toxicity by dermal application is low
Eye Contact	severely damaging; may damage
Inhalation	irritating; low vapour pressure & high viscosity makes inhalation of toxic quantities unlikely;
	despite extensive industrial use, no diethanolamine inhalation injury has ever been reported
Ingestion	human ingestion trials showed little effect beyond a laxative action or a slight diarrhoea

Effects, Chronic Exposure

General	prolonged exposure may cause dermatitis; rodent studies show anaemia and damage to liver kidneys & nervous system – no such effects seen in people working with DEA
Sensitising	not a sensitiser in humans or animals
Carcinogen/Tumorigen	not considered a tumorigen or a carcinogen in humans or animals – *N-nitrosodiethanolamine*
	(a possible human carcinogen) may form in metalworking fluids containing nitrites & DEA
Reproductive Effect	no known effect in humans or animals
Mutagen	no known effect on humans or animals
Synergistic With	nitrites to form N-nitrosodiethanolamine
Calculated LD_{50} (oral)	6800-1820mg/kg (rat), 3300mg/kg (mouse), 2000mg/kg (guinea pig), 2200mg/kg (rabbit)
Calculated LD_{50} (skin)	8400mg/kg (rabbit), 13,000mg/kg (guinea pig)
LC_{50} (inhalation)	not known – *no deaths in rodent tests; vapour pressure too low to form lethal concentration*

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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. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless viscous, hygroscopic liquid with slight ammonia odour ***OR*** colourless deliquescent crystals – *liquid yellows (to brown) on exposure to air*
Odour Threshold	0.27ppm
Vapour Pressure (*DEA only*)	0.0003mmHg / 0.002kPa (25°C / 77°F)
Evaporation Rate (*Butyl Acetate = 1*)	not known – not considered volatile
Vapour Density (air = 1)	3.6
Boiling Range	268°C/514°F – *decomposition above 200°C/390°F*
Freezing Point	28°C / 82°F – *supercools readily*
Specific Gravity	1.092 (20/20°C)
Water Solubility	complete
Also soluble in	most polar solvents; practically insoluble in hydrocarbons
Viscosity	~380centipoise (30°C / 86°F)
pH	11.5 (1 molar solution – approx 10%)
Conversion Factor	1ppm = 4.29mg/m^3
Molecular Weight	105grams per mole

6. FLAMMABILITY & FIRE FIGHTING

Flash Point	191°C / 375°F
Autoignition Temperature	662°C / 1224°F
Flammable Limits	1.6% – 9.8%
Combustion Products	carbon monoxide, nitrogen oxides, ammonia, smoke, part oxidised hydrocarbon fragments
Fire Fighting Precautions	water fog or spray; water jet may spread flame; fire fighters must wear SCBA
Static Charge Accumulation	cannot accumulate a static charge on agitation or pumping

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7. STABILITY / REACTIVITY

Dangerously Reactive With	strong oxidising agents; vigorous, violent reaction with strong acids & acid anhydrides; may ignite spontaneously on contact with gun cotton (finely divided cellulose nitrate) or nitrophenols
Also Reactive With	nitrating substances which may form explosive compounds; reacts with mercury to form shock-sensitive substances; halogens to form hydrogen halide gas, vigorously with carbon disulphide & isocyanates; reaction with hypochlorites form explosive chloroamines; when warm, reacts with aluminum to generate hydrogen gas
Stability	stable (see Decomposition, below); will not polymerize
Decomposes in Presence of	air causing gradual oxidation & heating – *if this occurs on a high surface area material like insulation or porous substance, reaction rate rises and spontaneous ignition may occur;* begins to decompose above 200°C / 390°F – products may include toxic hydrogen cyanide
Decomposition Products	transient oxidation products hydroxylamines or carbamates may be unstable
Sensitive to Mechanical Impact	no

8. PROTECTIVE EQUIPMENT / EXPOSURE CONTROL

ACGIH TLV	0.46ppm / 2mg/m^3
OSHA PEL	3ppm / 15mg/m^3
STEL	not listed
Ventilation	mechanical ventilation may be required to maintain airborne titre below TWAEV
Hands	butyl, neoprene, nitrile or "Viton" gloves recommended – *other types may also protect*
Eyes	safety glasses with side shields – *always protect the eyes*
Clothing	no special protective clothing required unless material is handled hot (*then splashing may occur because viscosity drops markedly on heating*)

9. HANDLING & STORAGE

Store above 35°C / 95°F (but below 49°C / 120°F) away from substances named in Part 7. Decomposition begins above 200°C. Decomposition products include highly toxic hydrogen cyanide.

This product may react with oxygen in the air (slowly) to form explosive substances. Ensure that containers are full and tightly sealed. If prolonged storage of a part container is anticipated, flush headspace with dry nitrogen gas prior to sealing. Always ensure that containers, whether empty or full, or part full, are tightly sealed unless in use. Do not transfer by air pressure as this may accelerate oxidation.

WARNING: Increasing the surface area by allowing porous or absorbent insulating materials (eg: glass fibre, mineral wool, vermiculite) to become wet with this product can greatly accelerate oxidation to the point of spontaneous combustion. If insulation becomes wet with DEA, soak with water to pre vent spontaneous heating & possible ignition.

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

10. SPILL PROCEDURES

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, sweep & pick up using plastic or aluminium shovel, & store in closed containers for recycling or disposal

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11. DISPOSAL

Waste Disposal **do not flush to sewer**, recycle if possible, local regulations may permit disposal 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

12. ENVIRONMENTAL INFORMATION

Bioaccumulation this product is not considered a bioaccumulator
Biodegradation this product degrades readily and rapidly in both soil (½-life is several days) and acclimated water (96% mineralisation in 10 days & 93% in 28 days) (DOW data 58% in 20 days)
Abiotic Degradation this product reacts with atmospheric hydroxyl radicals; its estimated ½-life in air is 4 hours
Mobility in soil, water this product is water soluble and will move readily in soil and water

Aquatic Toxicity

LC_{50} (Fish, 96hr) 589mg/litre (Cyprinodon variegatus),1400mg/litre (Gambusia affinis), 600-1000mg/litre (Lepomis macrochirus)
EC_{50} (Crustacea, 24hr) 2800mg/litre (Artemia salina), 170 & 180mg/litre (Daphnia magna)
EC_{50} (Algae) 75mg/litre (Scenedesmus subspicatus) 2.2mg/litre (Selenastrum capricornutum) 5548mg/litre (Skeletonema costatum

13. TRANSPORT REGULATIONS

Canada TDG	**PIN**	**UN- not regulated for transport**
AND	**Shipping Name**	**not regulated for transport**
U.S.A. 49 CFR	**Class**	**not regulated for transport**
	Packing Group	**not regulated for transport**
Marine Pollutant		**not a marine pollutant**

14. EMERGENCY INFORMATION

Canada	**Call CANUTEC (collect)**	**(613) 996-6666**
U.S.A.	**Call CHEMTREC**	**(800) 424-9300**

15. REGULATIONS

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

Allowable Tolerances: Diethanolamine is exempted from the requirement of a tolerance when used as a stabilizer for formulations used before crop emerges from soil in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

OSHA Standards: Vacated 1989 OSHA PEL TWA 3 ppm (15 mg/cu m) is still enforced in some states. [REF-23, p.363]

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

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Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 2 mg/cu m, skin. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded. 2008 Notice of Intended Changes: These substances, with their corresponding vaules and notations, comprise those for which (1) a limit is proposed for the first time, (2) a change in the Adopted value is proposed, (3) retention as an NIC is proposed, or (4) withdrawal of the Documentation and adopted TLV is proposed. In each case, the proposals should be considered trial values during the period they are on the NIC. These proposals were ratified by the ACGIH Board of Directors and will remain on the NIC for approximately one year following this ratification. If the Committee neither finds nor receives any substantive data that changes its scientific opinion regarding an NIC TLV, the Committee may then approve its recommendation to the ACGIH Board of Directors for adoption. If the Committee finds or receives substantive data that change its scientific opinion regarding an NIC TLV, the Committee may change its recommendation to the ACGIH Board of Directors for the matter to be either retained on or withdrawn from the NIC. Substance: Diethanolamine; Time Weighted Avg (TWA): 1 mg/cu m (Inhalable Fraction and Vapor); None; skin notation, A3: Confirmed animal carcinogen with unknown relevance to humans.; TLV Basis-Critical Effect(s): Liver & kidney damage.

Atmospheric Standards: Listed as a hazardous air pollutant generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Diethanolamine is included on this list.

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Diethanolamine is included on this list. Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerned with production, use, and exposure to EPA as cited in the preamble of the 51 FR 41329.

FIFRA Requirements: Diethanolamine is exempted from the requirement of a tolerance when used as a stabilizer, inhibitor for formulations used before crop emerges from soil in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

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

16. PREPARATION INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577
With data from RTECS, Haz. Substance Data Base, Cheminfo (CCOHS), IUCLID Datasheets (European Chem. Substance Info. System), & others, as available
Preparation Date: ***November 2003*** *Revision Date*: ***September 2006, December 2007, November 2010***

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