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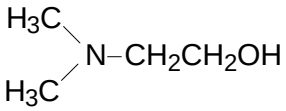
Technical Bulletin

N,N-DIMETHYLETHANOLAMINE (DMEA)

2-(Dimethylamino) Ethanol

DIMETHYLETHANOLAMINE (DMEA) is a clear, colorless, mobile liquid with an ammoniacal odor. It is miscible with water, alcohols, ether, and aromatic solvents. Since it contains both a tertiary amine group and a hydroxyl group, it undergoes reactions typical of amines and alcohols.



APPLICATIONS

Dimethylethanolamine is used in the preparation of water-reducible coating formulations. Government regulations covering the amount of organic solvent allowable in the air have spurred a search for emission control procedures. One of the most promising is the replacement of the organic solvent by water. The resins used in coating formulations are not water soluble, but can be made so by reacting them with the amine.

Dimethylethanolamine is one of the raw materials used to make dimethylaminoethyl methacrylate. Polymers produced from the methacrylate are useful as antistatic agents, soil conditioners, electrically conducting materials, paper auxiliaries, and flocculating agents.

Dimethylethanolamine can be used to control corrosion in boiler water condensate return lines. The dimethylethanolamine boils with the steam and is carried with it throughout the system. When the steam condenses, the dimethylethanolamine neutralizes any acidic components present in the condensate, thereby controlling the corrosion which would otherwise occur. For more applications, see other applications.

SALES SPECIFICATIONS

Property	Specifications	Test Method*
Appearance	Clear and substantially free of foreign matter	ST-30.1
Alkalinity, as DMEA, wt. %	99.0 min.	ST-5.5
Color, Pt-Co	20 max.	ST-30.12
Water, wt. %	0.2 max.	ST-31.53, 6

*Methods of Test are available from Huntsman Corporation upon request.

ADDITIONAL INFORMATION

Regulatory Information

DOT/TDG Classification	2-Dimethylaminoethanol
HMIS Code	3-2-0
WHMIS Classification	B3, D1B, E
CAS Number	108-01-0

Chemical Control Laws

Canada, DSL	Listed
United States, TSCA	Listed

Typical Physical Properties

Boiling Range, ^{o}C (°F)	135 (275)
Flash point, CC, °C (°F)	41 (105)
Melting Point, ^{o}C (^{o}F)	-59 (-74)
pH	10
Vapor pressure, 20^{o}C, mm Hg	0.5
Viscosity, cSt, 20^{o}C	2.7

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TOXICITY AND SAFETY

Acute Toxicity

The results of acute toxicity testing using dimethylethanolamine (DMEA) indicate that this product is considered to be moderately toxic by single oral exposures and practically non-toxic by single dermal exposures. The oral LD_{50} in rats and the dermal LD_{50} in rabbits are 1.18 g/kg and greater than 3 g/kg, respectively. Acute irritation studies have shown this product to be extremely irritating/corrosive to the skin of rabbits, with a Draize dermal irritation score of 8.0 (maximum score 8.0). Given the results of the dermal irritation study, it is assumed that DMEA will be extremely irritating and corrosive to the eyes, as well.

Repeated Dose Toxicity

In a dietary study, rats were exposed to DMEA at dosages of 0.045 g/kg up to 0.89 g/kg DMEA in the diet over 90 days. Although increases in liver and kidney weights were observed at the highest dose level (0.89 g/kg), there were no changes noted in the liver or kidneys during microscopic examination of these organs.

In a vapor inhalation study, rats were exposed to DMEA vapors of 0, 8, 25 or 75 ppm for 6 hours per day, 5 days per week, for 13 weeks. The rats exposed to 25 and 75 ppm DMEA showed a transient corneal opacity. In addition, rats exposed to 75 ppm over the course of this study showed decreased body weight gain and lesions of the respiratory and olfactory epithelium. These findings are not unexpected, due to the dermal corrosive properties of DMEA.

Developmental Toxicity

In this study, female rats were exposed to DMEA vapors of 0, 10.4, 29.8 or 100 ppm for 6 hours per day on gestational days 6 through 15. Maternal toxicity (reduced weight gain and ocular changes) were observed in the 100 ppm group only. There was no consistent pattern of fetal toxicity or developmental effects noted in the offspring.

Genetic Toxicity

A battery of genetic toxicity studies, employing an Ames Assay, a Micronucleus Test and an Unscheduled DNA Synthesis (UDS) Assay were conducted using dimethylethanolamine. These studies were negative (non-genotoxic) in their responses to DMEA.

Human Health Effects and First Aid

On the basis of the above animal toxicity studies, the principal health hazard from accidental exposures to dimethylethanolamine is a moderate to severe irritation/corrosion of the eyes, skin, and mucous membranes. Chemical-type goggles with face shield must be worn during handling or use of the undiluted product or concentrated solutions. Contact lenses should not be worn. Protective clothing, and gloves resistant to chemicals and petroleum distillates, must be worn. Should accidental eye and skin contact occur, flush eyes with large amounts of water for at least 15 minutes, after which a physician should be consulted. During flushing of the eyes, eyelids should be held apart to permit rinsing of entire surface of eye and lids. For skin contact, immediately flush skin with large amounts of water for at least 15 minutes. Clothing wet with the product must be removed immediately and laundered before reuse.

If DMEA is accidentally ingested, and the individual is conscious and can swallow, they should be given two large glasses of water, after which a physician should be consulted. Since this product is expected to produce severe irritation/corrosion of mucous membranes, vomiting should not be induced, due to the possibility of lung damage from aspiration of the product into the lungs during vomiting.

Under usual circumstances, exposure to harmful quantities of vapor should not be a health problem, however, exposure to appreciable concentrations of dimethylethanolamine vapors can result in irritation to the eyes, nose and throat, and may produce temporary and reversible hazy or blurred vision. In addition, prolonged or repeated exposures to DMEA may result in asthma-like reactions or allergic skin reactions in certain individuals. These symptoms disappear when exposure to DMEA is terminated. Adequate ventilation should be provided where a large quantity of product is exposed, or where mists or vapors are generated. Spills in confined areas should be cleaned up promptly, using appropriate personal protective equipment.

For additional information on the toxicity and safe handling of this product, consult the Material Safety Data Sheet (Safety Data Sheet in Europe) prior to use of this product.

HANDLING AND STORAGE

In order to maintain the high degree of purity with which dimethylethanolamine is manufactured and shipped, the following storage and handling considerations are recommended:

Dry Inert Gas Blanket: This product should be stored under a dry inert gas blanket, such as nitrogen, to minimize contamination resulting from contact with air and water.

Materials of Construction: Clean carbon steel is satisfactory as a material of construction for storage tanks and transfer systems, provided adequate precautions are observed to guard against rust contamination. In those cases where additional precautions are needed to preserve low color, stainless steel or aluminum should be used. Copper, or alloys containing copper, should be avoided.

Storage Temperature: Dimethylethanolamine has an extremely low viscosity and freezing point (-73.5°F). It will not freeze or become viscous during normal handling even though subjected to very severe weather conditions.

Spills or Leaks: Eliminate all sources of ignition in case of spills or leaks. Spills should be removed by absorbent materials or by washing with water.

Flammability: Dimethylethanolamine is classed as a combustible liquid (TCC flash point, 105°F). Ignition sources should be controlled where this product is handled, used, or stored. Fire-fighting procedures include the use of water spray, dry chemical, foam, or carbon dioxide. Water may be used to cool fire-exposed containers.

OTHER APPLICATIONS

The use of dimethylethanolamine has been studied in other applications. Some of these areas are:

- Preparation of resins which can be used to increase the dry strength or wet strength of paper.
- Preparation of a good treatment which imparts water repellency and fungus resistance to kiln-dried lumber.
- Preparation of textile assistants.
- Improvement of polyalkene dyeability by mixing the polyalkene with a dimethylethanolaminetreated copolymer of ethylene and an acrylate or maleate.
- Preparation of catalysts for polymerizing olefin oxides and olefin sulfides.
- Stabilization of perchloroethylene by the addition of epichlorohydrin, propargyl alcohol, and dimethylethanolamine.
- Preparation of an antistatic agent for polystyrene.
- Preparation of a bonding agent for bonding thermoplastic organic polymers to conductive substrates.
- Preparation of ion-exchange resins.
- Evaporable wetting agent in glass cleaning formulation.
- Vapor phase catalyst for curing urethane-based ink.
- Esters form clear aqueous solutions on partial neutralization with mineral acid for use in cationic flow processes.
- Preparation of fatty acid soaps which are effective wax emulsifiers for water-resistant floor polishes, particularly polishes for light-coloredlinoleums.
- Used as an intermediate for the manufacture of antihistamines and local anesthetics in the pharmaceutical industry.
- Preparation of soluble chloromethylated polymers

of styrene and alpha-methyl styrene.

AVAILABILITY

Dimethylethanolamine is available in bulk and in 55-gallon drums of 400 pounds net weight. Samples are available by contacting our sample department at 1-800-662-0924.

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