HUNTSMAN

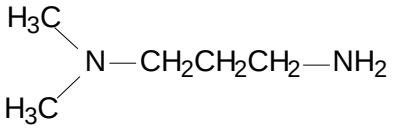
Enriching lives through innovation

Technical Bulletin

DIMETHYLAMINOPROPYLAMINE (DMAPA)

N,N-Dimethyl-1, 3-Propanediamine

Dimethylaminopropylamine (DMAPA) is a clear, essentially colorless liquid with a typical amine odor. It is completely soluble in water, benzene, heptane, and other organic solvents.



SALES SPECIFICATIONS

Property	Specifications	Test Method*
Appearance	Clear and substantially free of foreign matter	ST-30.1
Color, Pt-Co	25 max.	ST-30.12
DMAPA, wt%	99 min.	ST-5.5
Water, wt%	0.2 max.	ST-31.53, 6

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

ADDITIONAL INFORMATION

Regulatory Information

See SDS for all regulatory information.

Shelf Life

The product should retain its conformance to sales specifications for a period of at least two years after date of manufacture if the product is stored at less than 100°F in its undamaged, unopened, factory packaged container.

In general, the user should determine the suitability of any chemical compound, no matter what the shelf life or length of time of storage. Each user should conduct a sufficient investigation to establish the suitability of any product for his intended use.

Typical Properties

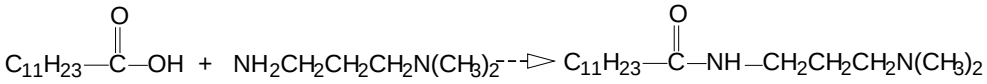
Flash point, TCC, °C (°F)	35 (95)
Boiling point, °C (°F)	135 (275)
Equivalent weight	51
Molecular weight	102.18
pH	12
Refractive index, n_D^{20}	1.4350
Specific gravity, 20/20°C	0.82
Vapor Pressure, mm Hg, 20°C (68°F)	5
Viscosity, cSt, 20°C (68°F)	1
Water solubility, %	> 10

HUNTSMAN

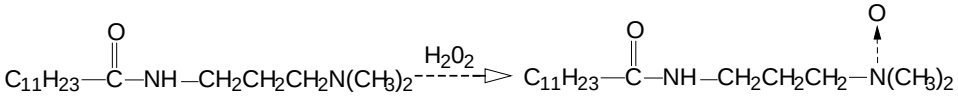
Enriching lives through innovation

APPLICATIONS

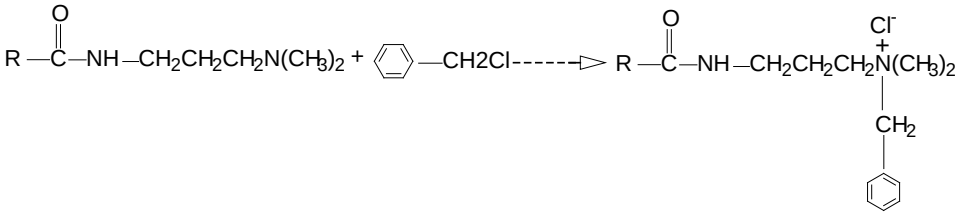
Dimethylaminopropylamine contains one primary and one tertiary amine group, which makes it of interest in many applications. For instance, when DMAPA is heated with a fatty acid, an amide containing a tertiary amine group is formed.



Such amides can be treated with hydrogen peroxide to give amine oxides which show excellent detergent and foam boosting properties.



The amide can also be treated with alkyl or aralkyl halides, such as benzyl chloride, to give quaternary ammonium compounds which have been used to prepare smooth and soft textile fibers that are water-resistant and stable to light.



Quaternary ammonium compounds are effective as hair-cleaning and washing aids. Such quaternized amines are water soluble, odorless, and relatively nontoxic to humans. They are useful as antiseptics, wetting agents, textile dyeing and finishing aids, and emulsifiers.

Betaines prepared from DMAPA are used in shampoos and bath preparations to reduce static electricity and improve the body, gloss, and manageability of wet hair, and improve the feel of the skin after a bath.

An amphoteric surfactant prepared from DMAPA is used to prepare a shampoo which causes little irritation of the eyes.

Properties of gasoline are reported to be improved by the addition of DMAPA or compounds based upon DMAPA. The reaction product of DMAPA with polyisobutenyl chloride is reported to counteract engine fouling, thereby reducing hydrocarbon exhaust gas emissions. The reaction of DMAPA with polyisobutenyl chloride and α, β-dibromopropionitrile gives a product which reportedly is an effective carburetor cleaner. Carburetor detergents have been prepared by reacting DMAPA with alkylphenol and an aldehyde or with thioglycolic acid and chlorinated polyisobutene.

Dimethylaminopropylamine has been used for preparing good corrosion inhibitors (amine phosphates) for aviation gasoline. Heating DMAPA and urea yields a product which is useful as an octane requirement reducer.

Ash-free lubricant additives were prepared by reacting DMAPA with an ethylene, propylene, or 1,4 hexadiene copolymer. A lubricating oil having dispersancy properties and good viscosity index contains, along with other components, a DMAPA-modified hydroperoxidized ethylenepropylene copolymer. A detergent for a lubricating oil has been prepared from DMAPA reacted with maleic anhydride and an ethylene-propylene copolymer. A lubricating oil additive effective in improving dispersancy, wear, and corrosion properties has been prepared from DMAPA and an alkyl phenol, formaldehyde, and sulfur.

Water dispersible coating compositions useful for preparing electrophoretic coating compositions using the substrate as the cathode are prepared from DMAPA, polybutadiene, and maleic anhydride. These coatings can also be prepared from DMAPA, an epoxy resin, acetic acid, and an unsaturated monoisocyanate. A polybutadiene derivative and an epoxy resin derivative are combined to prepare a coating composition which gives hardened coatings with good corrosion resistance.

Polyester films and fibers treated with DMAPA have a reduced tendency to develop static electricity and their receptivity to acid wool dyes is greatly improved. An amide made from stearic acid and the amine is used as a viscosity decreasing additive in aqueous softening agents useful for textile finishing or dyeing.

A quaternary ammonium compound made from DMAPA is useful as a non-yellowing fabric softener which can be used in the rinse cycle, in combination with detergent formulations in the wash cycle, or as a liquid concentrate to be applied to fabrics. A fluorescent whitener for acrylic fibers was prepared from 4,5-dichloronaphthalic anhydride, DMAPA, and 2-ethoxyethanol. Reaction products of DMAPA and C_{11-14} epoxyalkanes were used to prepare detergent compositions suitable for laundering textiles in cold water.

Finishing poly(ethylene terephthalate) fibers with a composition containing DMAPA and a siloxane followed by heat treatment gave staple fibers with increased resilience.

Quaternary salts prepared from polymethacrylate, DMAPA, and allyl chlorides imparted good antistatic properties to nylon, polyester, and other synthetic fabrics.

DMAPA has been added to polymeric systems to alter the dye-reception properties thereof.

Basic phthalocyanine dyes have been prepared from DMAPA. Such dyes are reported to be useful for dyeing plastics, synthetic varnishes, and fibers of cellulose, nylon, and polyacrylonitrile. They are also used in printing inks.

Dimethylaminopropylamine has been used effectively for curing epoxy resins.

Derivatives of dimethylaminopropylamine have been examined in pharmaceutical applications. Diquaternary salts of DMAPA derivatives have been suggested for regulating blood pressure. Sulfonamides possessing antiseptic properties have been prepared from DMAPA and aryl sulfonyl chlorides. The condensation product of DMAPA with a substituted thiadiazole yielded a drug which showed antimalarial activity.

The reaction product of DMAPA and α,α'- dichloro-p-xylene was effective in preventing the ozone deterioration of rubber.

An ion exchange resin with high exchange capacity was prepared by treating a cross-linked alkyl acrylate polymer with DMAPA.

A cationic sizing agent for paper was prepared by reacting maleic anhydride-α-olefin copolymers with DMAPA.

Water-soluble polyelectrolytes useful as flocculants in papermaking are prepared from DMAPA and polyvinyl chloride, a styrene-vinyl chloride copolymer, and C_{20-30} chlorinated paraffins, and from DMAPA, water, and acrylonitrile.

A product useful in flocculating and settling an aqueous suspension of Georgia kaolin clay is prepared from a styrene-maleic anhydride copolymer, DMAPA, and methyl chloride. One suitable as a precipitant for waste treatment was prepared from DMAPA and an alkenyl- or alkylsuccinic anhydride.

Polystyrene is stabilized to outdoor weathering by the incorporation of DMAPA.

TOXICITY AND SAFETY

For information on the toxicity and safe handling of this product, consult the Safety Data Sheet prior to use of this product.

HANDLING AND STORAGE

Carbon steel is a satisfactory material for storing and handling dimethylaminopropylamine. Copper, zinc, lead, or alloys containing any of these materials should not be used since they will be attacked by the product.

The freezing point of DMAPA is below -60°F, and the viscosity is low. Therefore, heating the storage tank should not be necessary.

Enriching lives through innovation

Dimethylaminopropylamine will discolor when exposed to air. The product is also hygroscopic and will pick up moisture. If either of these two characteristics is not acceptable in the intended use of the product, it will be necessary to pad the storage tank. We recommend a nitrogen pad, which is low in both carbon dioxide and water content.

Carbon steel is acceptable for transfer lines. Lines should be blown or drained clean after each use. Otherwise, the product will discolor when it is left in the lines for an extended period. In cases where it is impossible to drain lines, or where the dimethylaminopropylamine is handled warm, stainless steel will be required. Since the product will leach conventional pipe dopes from threaded connections, the lines should be welded or flanged. Satisfactory gasketing materials are Garlock 7021, U. S. Rubber 899, John Crane 333, Johns-Manville 70, or equivalent.

Carbon steel centrifugal pumps are satisfactory. Either pump packing or a mechanical seal may be used. Braided TEFLON® polymer is a satisfactory packing material. Seals may be John Crane Type 9, Durametallic Type RO-TT, or equivalent, with either stellite-carbon or tungsten faces and TEFLON® V-rings.

Dimethylaminopropylamine is a flammable material; therefore, care should be taken in handling and storage to keep the product away from heat and open flame. The amine is also a corrosive material; therefore, care should be taken to avoid contact with the product.

AVAILABILITY

Dimethylaminopropylamine is available in tank cars, tank wagons, and in drums of 370 pounds (168 kilograms) net weight. Small samples are available in the Americas region by contacting our sample department at 1-800-662-0924. In other regions, samples may be obtained by contacting a Huntsman Performance Products sales office.

Main Offices US: Huntsman Corporation / 10003 Woodloch Forest Drive / The Woodlands, Texas 77380 / 281-719-6000
Technical Service US: 8600 Gosling Road / The Woodlands, Texas 77381 / 281-719-7780

Main Offices Europe: Huntsman Belgium BVBA / Everslaan 45 / B-3078 Everberg, Belgium / 32-2 -758-9211
Technical Service Europe: Technical Services Representative / Everberg Office

Main Offices Asia Pacific: Huntsman Singapore PTE / 150 Beach Road #37-00 Gateway West / Singapore 189720 / 65 6297 3363
Technical Service Asia Pacific: Huntsman Chemistry R&D Center (Shanghai) Co. Ltd. / 479 Wen Jing Road, Min Hang Economic & Technological Development Zone / Shanghai 200245, P R China / 86-21-3357-2609

www.huntsman.com