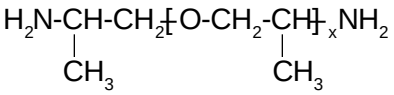
# Technical Bulletin

HUNTSMAN

## JEFFAMINE® D-400 POLYOXYPROPYLENEDIAMINE

[CAS 9046-10-0]

### STRUCTURE



x = 5.6

### DESCRIPTION

JEFFAMINE D-400 polyoxypropylenediamine is one member of a family of Huntsman Corporation's polyamines having as their backbones repeated oxypropylene units. As shown by the above structure, JEFFAMINE D-400 is a difunctional primary amine having an average molecular weight of approximately 400. Its amine groups are located on secondary carbon atoms at the ends of an aliphatic polyether chain.

JEFFAMINE D-400 is light in color, low in viscosity and vapor pressure, high in primary amine content, and completely miscible in a wide variety of solvents, including water.

### SALES SPECIFICATIONS

| | |
|---|---|
| Appearance | Colorless to pale yellow with slight haze |
| Color, Pt-Co | 100 max. |
| Primary amine, % of total amine | 97 min. |
| Total acetylatables, meq/g | 4.2 min.<br>4.9 max. |
| Total amine, meq/g | 4.1 min.<br>4.7 max. |
| Water, % | 0.25 max. |

### TYPICAL PHYSICAL PROPERTIES

| | |
|---|---|
| Brookfield viscosity, cp, 25°C (77°F) | 21 |
| Density, lb/gal, 20°C | 8.1 |
| Equivalent weight with epoxies ("Amine hydrogen equivalent weight," or AHEW) | 115 |
| Flash point, PMCC, °C (°F) | 163 (325) |
| pH, 5% aqueous solution | 11.6 |
| Refractive index, $n_D^{20}$ | 1.4482 |
| Specific gravity, 20/20°C | 0.9702 |
| Vapor pressure, mm Hg/°C | 1/165<br>10/193 |

### AVAILABILITY

JEFFAMINE D-400 is available in tank cars, tank wagons, 55-gallon drums of 440 pounds net weight, and 5-gallon cans. Samples are available from any Huntsman Corporation sales office.

### APPLICATIONS

JEFFAMINE D-400 polyoxypropylenediamine undergoes reactions typical of primary amines. As an epoxy curing agent, JEFFAMINE D-400 leads to tough, clear, flexible, impact-resistant coatings, castings, and adhesives. In many cases, JEFFAMINE D-400 is used in conjunction with other curing agents, contributing flexibility to the finished product. Compared to JEFFAMINE D-230, the lower-molecular-weight analog of JEFFAMINE D-400, epoxies made with JEFFAMINE D-400 will exhibit not only greater flexibility, but also less shrinkage, slower cure, and lower heat distortion temperatures.







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JEFFAMINE D-400 finds use in protective and decorative epoxy coatings. Paving and construction uses include seamless floors and crack fillers. JEFFAMINE D-400 can be used in low-viscosity epoxy consolidants and patching compounds for the restoration and preservation of rotted wood.

JEFFAMINE D-400, along with its JEFFAMINE analogs, finds use in filament- and mat-reinforced composites where the end uses range from aerospace components to windmills.

Epoxy adhesives having high peel strengths can be made from a combination of JEFFAMINE D-400 and its higher-molecular-weight analog, JEFFAMINE D-2000. Encapsulation of electrical components is another epoxy application for JEFFAMINE D-400.

As for nonepoxy applications, JEFFAMINE D-400 finds use in polyurethane RIM (reaction-injection molding), thermoplastic polyamide adhesives, and, as salts, in cutting fluids and fire retardants.

## STORAGE AND HANDLING

**Materials of Construction:**

**At temperatures of 75-100°F**

| | |
|---|---|
| Tanks | Carbon steel |
| Lines, valves | Carbon steel |
| Pumps | Carbon steel |
| Heat exchange surfaces | Stainless steel |
| Hoses | Stainless steel, polyethylene, polypropylene, Teflon |
| Gaskets, packing | Polypropylene or Teflon; elastomers such as neoprene, Buna N, and Viton should be avoided |
| Atmosphere | Nitrogen or dry air |

**At temperatures above 100°F**

| | |
|---|---|
| Tanks | Stainless steel or aluminum |
| Lines, valves | Stainless steel |
| Pumps | Stainless steel or Carpenter 20 equivalent |
| Atmosphere | Nitrogen |

While JEFFAMINE D-400 may be stored under air at ambient temperatures for extended periods, a nitrogen blanket is suggested for all storage in case of accidental high temperatures. It should be noted that pronounced discoloration is likely to occur at temperatures above 140°F, whatever the gaseous pad.

Clean-out of lines and equipment containing JEFFAMINE D-400 is easy; warm water is all that is required.

In the event of spillage of this product, the area may be flushed with water. The proper method of disposal of waste material is by incineration with strict observance of all federal, state, and local regulations.

## SAFETY AND TOXICITY

JEFFAMINE D-400 should be considered hazardous, having the potential to cause severe burns to the skin and eyes and toxic effects by absorption through the skin or by swallowing. Chemical-type goggles with face shield and impervious gloves must be worn when handling this product. When handling large quantities subject to splashes and spills, impervious suits and rubber boots must also be worn.

Should accidental contact occur, flush the eyes thoroughly with water for at least 15 minutes and get immediate medical attention. In case of skin contact, immediately wash the exposed area with soap and plenty of water. If drenched, remove contaminated clothing under a safety shower. Wash clothing before reuse.

JEFFAMINE D-400 is considered toxic if swallowed or absorbed through the skin. The single oral dose $LD_{50}$ value in rats is 1.10 g/kg and the single dermal $LD_{50}$ value in rabbits is 0.98 g/kg. The Draize score for skin irritation in rabbits is 4.6/8.0 and the product has been determined to be corrosive to the skin by the DOT 4-hour test. The Draize score for eye irritation in the rabbit is 60.7/110.0.

In normal operations, the vapor pressure of JEFFAMINE D-400 is sufficiently low that no significant concentrations would be present in the workplace atmosphere. However, supplied air respiratory protection is recommended for cleaning up large spills or for entry into confined spaces.

JEFFAMINE D-400 has been found to be inactive with respect to mutagenicity in the Ames *Salmonella*/microsome plate test, the Balb/3T3 *in vitro* cell transformation assay, and the mouse lymphoma forward mutation assay.

For further information, request the Material Safety Data Sheet.