HUNTSMAN

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PRODUCT SAFETY SUMMARY:

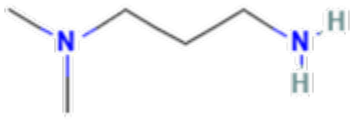
Dimethylaminopropylamine (DMAPA)

This Product Safety Summary is intended to provide a general description of certain Huntsman chemical substances and products containing the chemical substance(s). The information in this Summary is not intended to replace the information included on the Safety Data Sheet (SDS), Product Safety Label, and other safe use and handling literature for the chemical substance(s).

Chemical Identity

Name	Other Identifiers	Commercial name
Dimethylaminopropylamine (DMAPA)	3-aminopropyldimethylamine N,N-Dimethyl-1, 3-Propanediamine CAS# 109-55-7	DMAPA

Structure



DMAPA

General Product Overview:

DMAPA is marketed by Huntsman for industrial and professional use, to produce substances and articles for downstream users. DMAPA is a substituted propylamine which is produced via the reaction between dimethylamine and acrylonitrile to produce dimethylaminopropionitrile. Subsequent hydrogenation of DMAPN yields DMAPA. The substance is used as an intermediate in an industrial setting, however, DMAPA may be reformulated and reacted by downstream users into products used by professionals and consumers.

Applications and Uses:

Due to its chemical properties DMAPA is very versatile and is used for several application such as: intermediate for hair products, betaine manufacturing, gasoline additives, antistatic agents, agricultural emulsifiers, fabric softeners, asphalt antistripping agents, and dyes; epoxy curing agent.

Physical and Chemical Properties:

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

Certain physical properties of DMAPA are summarized below:

Physical/Chemical Property	Result
Molecular weight	102
Boiling point, 760 mm Hg, °C	135
Freezing point, °C	< -50
Vapor pressure, mmHg, 20°C	5
Density, g/ml, 20°C	0.82
Water solubility (%)	>10
Flash point, °C	35
pH	12

Additional physical and chemical property information is available on the product Safety Data Sheet (SDS), which can be requested at SDS@huntsman.com.

Human Health Information:

The probability of experiencing health effects associated with exposure to DMAPA is controlled, provided the recommendations stated in the Safety Data Sheet are enforced. Adverse health effects are subject to dose level, route, and duration of exposure. DMAPA is classified as corrosive to the skin and eye, irritant to the respiratory tract and skin sensitizer. It is harmful to aquatic life and can be harmful to human if ingested or if in contact with the skin.

Different regulatory classification criteria apply in different geographic regions. These different criteria may result in different human health regulatory classifications for the same product in different geographic regions. Specific regulatory classification information is contained in the

Safety Data Sheet for each product in use in specific geographic region. The acute and chronic health effects information set forth below is based on US GHS.

All instructions found on the packaging should be followed. DMAPA is safe when used appropriately. The uses identified for the substance have been assessed as safe under several regulatory programs.

Summary- Toxicological data:

Effect Assessment	Result
Acute Oral Toxicity	Category 4
Acute Dermal Toxicity	Category 4
Skin Corrosion	Category 1B
Eye Damage	Category 1
Skin Sensitization	1B
Genotoxicity	Does not cause genetic defect
Specific target organ toxicity single exposure	May cause respiratory Irritation

Note: For more information on the health hazards of this substance and recommended protective equipment, please refer to the relevant SDS.

Acute Health Effects:

Likelihood/frequency of oral, dermal and inhalation exposures are low, if used under strictly recommended conditions and in a closed process.
Due to the high pH, almost any ocular contact with any DMAPA may cause irreparable damage, even blindness. Acute accidental dermal exposure to DMAPA may cause severe skin burns.
If inhalation occurs this may cause irritation of the respiratory tract.
Exposures may also cause allergic skin reactions in some individuals.

Acute dermal toxicity of DMAPA is low to moderate. The dermal LD50 from several studies is > 1000 mg/kg for DMAPA.
Acute oral toxicity of DMAPA is moderate. The oral LD50 for rats is in the range of 400 mg/kg. However, accidental ingestion will cause burns to the membranes of the mouth, throat, and stomach, and may cause gastrointestinal irritation or ulceration due to the corrosivity of the substance.

Chronic Health Effects:

Based on the results of the animal studies no specific chronic effect was observed after repeated exposure of DMAPA. No effects on reproduction or fertility were observed in the rats exposed orally to DMAPA. Extensive genetic toxicity studies conducted with DMAPA indicates that it does not cause genetic defects.

Environmental Information:

Summary: Ecotoxicological Data

Effect Assessment	**Result**
Short term toxicity to fish	Not harmful to fish.
Short term toxicity to aquatic invertebrates	Category 3
Toxicity to aquatic plants	Category 3

DMAPA is an industrial raw material. During normal operating conditions, procedural and/or control technologies are used to minimize emissions and potential exposure to DMAPA. The substance can be harmful to aquatic species including daphnids and aquatic plants.

Environmental Fate:

Summary: Environmental fate and pathway

Effect Assessment	**Result**
Abiotic Degradation - Hydrolysis as a function of pH	Hydrolytically stable
Ready biodegradability	Biodegradable
Adsorption on soil and sediment	Low adsorption potential

DMAPA is hydrolytically stable but it will readily biodegrade in freshwater. It has a low adsorption potential on soil and sediment. DMAPA will not bioaccumulate. DMAPA has low vapor pressures and releases via air are unlikely.

Potential Consumer Exposure:

Huntsman does not market DMAPA directly for consumer use. However, DMAPA may be formulate or reacted into products used by professionals and consumers. The substance has been assessed as safe for downstream use when the provisions laid down in the SDS are followed carefully.

Potential Occupational Exposure:

At Huntsman, DMAPA is manufactured in closed systems. During normal operating conditions, occupational exposure to DMAPA is not expected in the manufacturing process. Procedural and/or control technologies are used to minimize exposure during sampling, cleaning, maintenance, or in more open handling systems. Appropriate engineering controls (such as ventilation) and personal protective equipment should be used in accordance with the exposure guidelines and workplace practices identified in the Safety Data Sheet.

Safe Use Recommendations/Workplace Exposure Controls

Workplace exposure:
Exposure can occur either in a manufacturing facility or in the various industrial facilities that use DMAPA. Workers in industrial operations could be exposed during maintenance, sampling, testing, or other procedures. Workplace exposure is controlled and minimized by use of proper occupational handling procedures and personal protection and safety equipment. The exposure has been assessed as safe if the substance is used as directed on the label.

Huntsman follows and recommends that customers follow workplace exposure guidelines through a variety of industrial hygiene and ventilation measures. The substance has been assessed as safe for professional and industrial use, when the provisions laid down in the SDS are followed carefully.

Potential routes of worker exposure to DMAPA are through dermal contact and to a minor extent, through inhalation in spray application. Ingestion is not an anticipated route of exposure. Within this assessment, both industrial workers and trained professionals are evaluated. In general, all the worker situations are controlled to avoid any direct contact with the DMAPA through process engineering controls or by use of personal protective equipment (PPE).

Likelihood/frequency of skin and inhalation exposure is low, due to its usage under strictly controlled conditions and closed process. However, the use of gloves, safety googles, and impervious clothing is strongly advised and highlighted in the SDS.

EU REACH Status:
DMAPA has been registered under the European REACH Regulation EC/1907/2006 and the substance was found to be safe for the uses identified.

Regulatory Information/Classification and Labeling:

Regulations exist that govern manufacture, sales, transportation, use and disposal of DMAPA. These regulations may vary by city, state, country or geographic region. Information can be found by referring the relevant SDS.

Under the US GHS for Hazard Communication, substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the Safety Data Sheets. US GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

Labeling of DMAPA according to US GHS:

Hazard statement	H226: Flammable liquid and vapour. H302: Harmful if swallowed. H312: Harmful in contact with skin. H314: Causes severe skin burns and eye damage. H317: May cause an allergic skin reaction. H335: May cause respiratory irritation.
Signal word	Danger
Hazard pictogram	

The hazard statements and symbols presented here refer to the hazard properties of the concentrated substance and are meant to provide a brief overview of the substance's labeling. It is not intended to be comprehensive or to replace information found in the Safety Data Sheet.

References:
Information on registered substances is available on the European Chemicals Agency (ECHA) website at https://echa.europa.eu/registration-dossier/-/registered-dossier/14823

- Huntsman regional SDSs for DMAPA
- Huntsman Technical Bulletins for DMAPA

Disclaimer:
The information and recommendations in this publication are, to the best of our knowledge, information and belief, accurate at the date of publication. NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity, and behavior of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity, and behavior should be determined by the user and made known to handlers, processors, and end users.

NO PERSON OR ORGANIZATION EXCEPT A DULY AUTHORIZED HUNTSMAN EMPLOYEE IS AUTHORIZED TO PROVIDE OR MAKE AVAILABLE DATA SHEETS FOR HUNTSMAN PRODUCTS. DATA SHEETS FROM UNAUTHORIZED SOURCES MAY CONTAIN INFORMATION THAT IS NO LONGER CURRENT OR ACCURATE.