

Product Safety Assessment

DOW™ Monoisopropanolamine

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Names

- CAS No. 78-96-6
- DOW™ monoisopropanolamine
- 1-Amino-2-propanol
- MIPA

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Product Overview

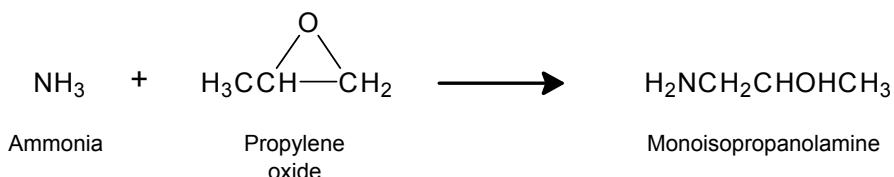
- DOW™ monoisopropanolamine (MIPA) is a colorless liquid with an ammonia-like odor.¹ For further details, see [Product Description](#).
- MIPA is a versatile chemical that is widely used as an emulsifier, stabilizer, surfactant, and chemical building block. It can neutralize pH, act as a buffer (stabilize pH), or add basicity (alkalinity) to a solution. Major applications include personal care products, pharmaceuticals, metalworking products, and waterborne coatings. MIPA is also used as a dispersant in titanium dioxide-based paints, plastics, and paper. It is also used in pesticide formulations, paint strippers, and polyurethane production.² For further details, see [Product Uses](#).
- Worker exposure is possible at a MIPA production site or at facilities using it to manufacture other products.³ Consumers could contact MIPA by using personal care products containing it. For further details, see [Exposure Potential](#).
- Eye contact with DOW MIPA may cause severe irritation and corneal injury, possibly resulting in permanent impairment of vision, even blindness. MIPA is corrosive to the skin. Brief contact may burn the skin resulting in pain, severe local redness, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts. Swallowing may result in gastrointestinal irritation or ulceration, including burns of the mouth and throat. Excessive inhalation may cause irritation to the nose and throat.⁴ For further details, see [Health Information](#).
- MIPA is highly reactive. Its liquid and vapors are combustible. MIPA is stable when used and stored as recommended. Exposure to moisture or elevated temperatures can cause MIPA to decompose. Avoid contact with strong acids, strong oxidizers, and halogenated hydrocarbons.⁵ For further details, see [Physical Hazard Information](#).

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Manufacture of Product⁶

- **Capacity** – Global annual capacity of isopropanolamines was estimated at 75,000 metric tons (165 million pounds) in 2007. Dow manufactures isopropanolamines at its facility in Plaquemine, Louisiana, in the United States.
- **Process** – Isopropanolamines are manufactured by reacting propylene oxide with ammonia. The ratio of ammonia to [propylene oxide](#) determines which of the three products—MIPA, DIPA or TIPA—is produced. By increasing the ratio of ammonia to propylene oxide, MIPA and DIPA production is favored. The reaction is as follows:



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Product Description⁷

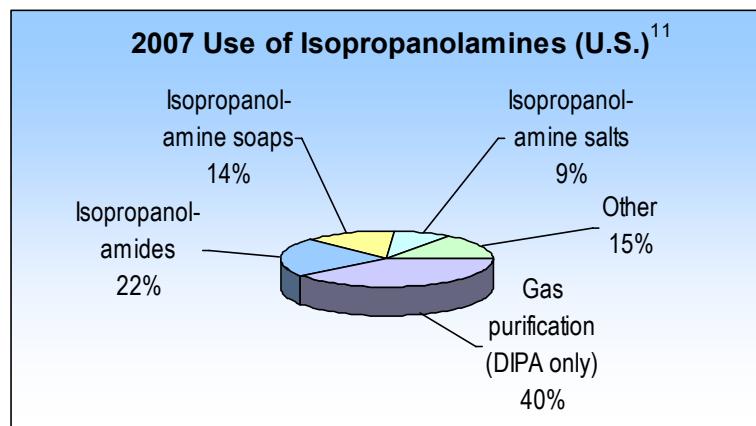
Monoisopropanolamine (MIPA) is the common name for 1-amino-2-propanol, a colorless liquid with an ammonia-like odor. MIPA is a highly reactive chemical with a pH of 11.4 as a 1% solution (a strong base).

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Product Uses^{8,9,10,11}

MIPA is a versatile chemical that is widely used as an emulsifier, stabilizer, surfactant, and chemical intermediate. It can neutralize pH, act as a buffer (stabilize pH), or add basicity (alkalinity) to a solution. MIPA solubilizes oils and fats, making it a useful cleanser and degreaser. Major applications include:

- **Personal care products** – MIPA can be used directly to adjust the pH of a product, or can be chemically modified to form emulsifiers, foam stabilizers, or viscosity modifiers. Isopropanolamides derived from MIPA function as thickeners in shampoo and foam boosters in products like shave cream. Fatty-acid soaps made from MIPA produce stable cosmetic emulsion formulations. MIPA-derived salts of dodecylbenzenesulfonic acid and lauryl sulfate are used in shampoos, creams, and lotions.
- **Pharmaceuticals** – MIPA is used as a chemical building block in the manufacture of antihistamines, antimalarials, antitussives, antibiotics, local anesthetics, antidepressants, muscle relaxants, and other drugs.
- **Industrial metalworking** – MIPA-derived isopropanolamine soaps are used to produce metal-cutting fluids, strippers, and wax-emulsion formulations. They offer corrosion protection, improve lubricity, act as a foam suppressant, and reduce friction in buffing, cutting, and cleaning fluids.



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- **Waterborne coatings** – MIPA is used as a dispersant in titanium dioxide-based paints, plastics, and paper.
- **Other uses** – MIPA is also used in pesticide formulations, paint strippers, and polyurethane production.

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Exposure Potential

MIPA is used in the production of industrial and consumer products. Based on the uses for MIPA, the public could be exposed through:

- **Workplace exposure¹²** – Workers who produce MIPA and those using it as a chemical intermediate or in product formulations could be exposed during maintenance, sampling, testing, or other procedures. MIPA is manufactured in a closed system using engineering controls that prevent the escape of liquid or vapors and minimize release to the environment. The potential for exposure is reduced by engineering controls and personal protective equipment. Facilities that manufacture or use MIPA should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. See [Health Information](#).
- **Consumer exposure to products containing MIPA** – MIPA or MIPA-derived fatty acid soaps or alkanolamides may be used at concentrations well below those causing health effects in animal studies in the following personal care products: shampoos, conditioners, shave cream, waterproof makeup, stick antiperspirants, cream sunscreens, bath and shower gels, hand and body lotions, and many others.¹³ See [Health Information](#).
- **Environmental releases¹⁴** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, ditches, sewers, waterways, or groundwater. For small spills, absorb with noncombustible materials such as clay, vermiculite, and Zorbball. **Do not** use sawdust or cellulose. Collect absorbed material in suitable and properly labeled containers. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to contain the spill. Isolate the area and evacuate unnecessary personnel. Ventilate the area, keeping upwind of the spill. Eliminate all sources of ignition. Only properly trained and protected personnel must be involved in clean-up operations. Using appropriate safety equipment, transfer the recovered material into suitable and properly labeled containers. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **In case of fire** – Keep people away and deny unnecessary entry. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. Avoid contact with this material during fire-fighting operations. Use water fog or fine spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. **Do not** use a direct water stream as it may spread the fire. Follow emergency procedures carefully. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).

For more information, see the relevant [Safety Data Sheet](#).

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Health Information^{15,16}

Eye and Skin Contact – Eye contact with relatively concentrated MIPA may cause severe irritation with corneal injury, possibly resulting in permanent impairment of vision, even blindness. Chemical burns to the eye may occur. MIPA is corrosive to the skin. Brief contact may burn the skin causing pain, severe local redness, and tissue damage. If the skin is scratched or cut, damage could be more severe. Prolonged or widespread skin contact may result in absorption of potentially harmful amounts. MIPA did not cause allergic skin reactions when tested in animals.

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Inhalation – Inhaling excessive amounts of MIPA may cause irritation to the nose and throat.

Ingestion – MIPA has low toxicity if swallowed. However, swallowing MIPA could result in burns of the mouth and throat as well as gastrointestinal irritation or ulceration. Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage and lung injury.

Other – Based on available data, repeated exposures are not anticipated to cause significant adverse effects. MIPA does not damage genetic material as *in vitro* genetic toxicity studies were negative.

For more information, see the relevant [Safety Data Sheet](#).

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Environmental Information¹⁷

MIPA is not likely to accumulate in the food chain (bioconcentration potential is low) and is readily biodegradable. MIPA is slightly toxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant [Safety Data Sheet](#).

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Physical Hazard Information¹⁸

MIPA liquid and vapor are combustible. MIPA is stable when used and stored as recommended. Do not store MIPA in copper, copper alloys, or galvanized containers. Exposure to moisture or elevated temperatures can cause MIPA to decompose. Decomposition products depend upon temperature, air supply, and the presence of other materials. Heating above 140°F (60°C) in the presence of aluminum can result in corrosion and generation of flammable hydrogen gas. MIPA is corrosive when wet.

Avoid contact with strong acids, strong oxidizers, and halogenated hydrocarbons.

For more information, see the relevant [Safety Data Sheet](#).

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of MIPA. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#), [Technical Data Sheet](#), or [Contact Us](#).

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Additional Information

- Safety Data Sheet (<http://www.dow.com/webapps/msds/msdssearch.asp>)
- Contact Us (<http://www.dow.com/amines/contact/index.htm>)
- *DOW™ Monoisopropanolamine (MIPA)*, Technical Data Sheet, The Dow Chemical Company, Form No. 111-01424 (<http://www.dow.com/amines/lit/iso-lit.htm>)
- *Isopropanolamines: Basic Chemicals with Surfactant Properties for Personal Care Products*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01344 (<http://www.dow.com/amines/lit/iso-lit.htm>)

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- *Monoisopropanolamine (MIPA): Effective Dispersant in TiO₂ Slurries*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01346 (<http://www.dow.com/amines/lit/iso-lit.htm>)
- Greiner, Elvira O. Camara, "Isopropanolamines," *CEH Product Review: Chemical Economics Handbook*, SRI Consulting, October 2008

For more business information about isopropanolamines, visit the Dow [Amines website](#) at www.dow.com/amines/.

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References

- ¹ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1 and 4.
- ² *DOW™ Monoisopropanolamine (MIPA)*, Technical Data Sheet, The Dow Chemical Company, Form No. 111-01424-1204 AMS, page 1.
- ³ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1–2 and 5.
- ⁴ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 3–4.
- ⁵ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1 and 4–5.
- ⁶ Greiner, Elvira O. Camara, "Isopropanolamines," *CEH Product Review: Chemical Economics Handbook*, SRI Consulting, October 2008, pages 4–5.
- ⁷ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1 and 4.
- ⁸ *Dow Monoisopropanolamine (MIPA)*, Technical Data Sheet, The Dow Chemical Company, Form No. 111-01424-1204 AMS, page 1.
- ⁹ *Isopropanolamines: Basic Chemicals with Surfactant Properties for Personal Care Products*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01344-1198 AMS, November 1998, page 1.
- ¹⁰ *Monoisopropanolamine (MIPA): Effective Dispersant in TiO₂ Slurries*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01346-1198 AMS, November 1998, page 1.
- ¹¹ Greiner, Elvira O. Camara, "Isopropanolamines," *CEH Product Review: Chemical Economics Handbook*, SRI Consulting, October 2008, pages 6–7.
- ¹² *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 3–4.
- ¹³ *Isopropanolamines: Basic Chemicals with Surfactant Properties for Personal Care Products*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01344-1198 AMS, November 1998, page 1.
- ¹⁴ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 2–3.
- ¹⁵ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1–2 and 5.
- ¹⁶ *ISOPROPANOLAMINES: Toxicology Overview*, Product Information Sheet, The Dow Chemical Company, Form No. 111-01347-0604, November 1998, page 1.
- ¹⁷ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 5–6.
- ¹⁸ *Monoisopropanolamine Material Safety Data Sheet*, The Dow Chemical Company, ID No. 50043/1001, Version 2.0, July 20, 2007, pages 1 and 3–5.

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