Product Safety Assessment

Aminoethylethanolamine (AEEA)


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Names
- CAS No. 111-41-1
- DOW™ aminoethylethanolamine
- AEEA
- 1-(2-Hydroxyethylamino)-2-aminoethane
- 2-((Aminoethyl)amino)ethanol
- 2-(2-Aminoethylethanol)
- 2-(2-Hydroxyethylamino)ethylamine
- 2-Amino-2'-hydroxydiethylamine
- Monoethanolhexenediamine
- N-(2-Aminoethyl)ethanolamine
- N-(2-Hydroxyethyl)-1.2-ethylenediamine
- N-(2-Aminoethyl)ethanolamine
- N-(2-Hydroxyethyl)ethylenediamine
- N-Aminoethylethanolamine
- EC No. 203-867-5
- N-Hydroxyethyl-1,2-ethanediame
- (2-Hydroxyethyl)ethylenediamine
- (β-Hydroxyethyl)ethylenediamine
- 2-(2'-Aminoethylamino)ethanol
- 2-(2-Aminoethylamino)ethanol
- 2-[(2-Aminoethyl) amino] ethanol
- Aminoethylethanolamine
- N-(2' Hydroxyethyl)ethylenediamine
- N-(2-Hydroxyethyl)-1,2-ethanediame
- N-(2-Hydroxyethyl)ethylenediamine
- N-(β-Hydroxyethyl)-1,2-ethanediame
- N-(β-Hydroxyethyl)ethylenediamine
- N-β-Hydroxyethylhexylenediamine

Product Overview
- Aminoethylethanolamine (AEEA) is a linear member of the ethyleneamines family. At room temperature, it is a clear, colorless liquid with a weak ammonia-like odor. For further details, see Product Description.
- AEEA is used in the manufacture of lube oil additives, fuel additives, chelating agents, surfactants, and fabric softeners, among other applications. For further details, see Product Uses.
- AEEA is used in closed systems. Workplace exposure can occur either in facilities that manufacture AEEA or in the various industrial or manufacturing facilities that use this product. AEEA is not sold directly to consumers, but it is formulated into fabric softeners that may be used by consumers. Always read the product label prior to use and carefully follow instructions. For further details, see Exposure Potential.

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- Contact with AEEA can cause severe burns to the eyes and burns to the skin, or to the mouth and throat if swallowed. Exposure to liquid AEEA may result in an allergic skin reaction. This product poses an aspiration hazard; it may enter the lungs and cause damage. AEEA has caused birth defects in laboratory animals and has also been toxic to the fetus in animal tests.³ For further details, see Health Information and the relevant Safety Data Sheet.
- If released to the environment, AEEA is readily biodegradable according to the OECD 301F Test for biodegradability. AEEA has very high mobility in soil, but is unlikely to accumulate in the food chain (bioconcentration potential is low). AEEA is slightly toxic to aquatic organisms on an acute basis.³ For further details, see Environmental Information.
- AEEA is stable under recommended storage and use conditions. This product can react with a variety of chemicals. Organic-based absorbents should not be applied to clean up spills. AEEA can react with carbon dioxide in the air to form amine-carbamate salts, which can plug vent or relief lines.³,⁴ For further details, see Physical Hazard Information.

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Manufacture of Product³
- Capacity – Global annual production of ethyleneamines was estimated at 468,100 metric tons (1.03 billion pounds) in 2012.
- Process – AEEA is produced by reacting ethylene dichloride with an excess of ammonia under high pressure and moderate temperature. The resultant ethylene amine hydrochloride solution is neutralized with caustic soda to form aminoethylethanolamine and other ethyleneamines, which are then separated and purified by distillation. Sodium chloride is formed as a by-product. The reaction sequence is shown below.

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Product Description¹,³
AEEA (C₄H₁₂N₂O) is a linear member of the ethyleneamines family. At room temperature, it is a clear, colorless, oily liquid with a weak ammonia-like odor. AEEA is water soluble, and its dilute solutions have an alkaline pH.

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Product Uses¹,²,⁵
Globally, AEEA is used as an important intermediate in the manufacture of lube oil additives, fuel additives, chelating agents, surfactants and fabric softeners among other applications. Estimated U.S. consumption of AEEA by application is shown in the chart.

Uses for AEEA in the United States⁵
- Lube/Oil Additives 79%
- Surfactants 10%
- Fabric Softeners 10%
- Other 1%

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Exposure Potential

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

- **Workplace exposure** – Exposure can occur either in facilities that manufacture AEEA or in the various industrial or manufacturing facilities that use AEEA. It is produced, distributed, stored, and consumed in closed systems. Those working with AEEA in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to products containing AEEA** – Dow does not sell AEEA for direct consumer use, but it is used as a component in products such as fabric softeners, which may be used by consumers. Read and follow product safety labels carefully. See Health Information.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface, or ground water. Eliminate all sources of ignition and ground bond all containers and handling equipment. For small spills, AEEA should be absorbed with materials such as clay, dirt, Milsorb®, or sand. Do not absorb spills with materials such as organic absorbents, peat moss, ground corn cobs, cellulose, or sawdust. This material is considered slightly toxic to aquatic organisms on an acute basis. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the product should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Evacuate the area. Only trained and properly protected personnel should be involved in clean-up operations. Keep upwind of the spill. Ventilate the area of the leak or spill. Use appropriate safety equipment. Prevent the product from entering into soil, ditches, sewers, waterways and/or groundwater. Contain spilled material if possible. For small spills, absorb with materials such as clay, dirt, Milsorb®, or sand. Do not use absorbent materials such as peat moss, ground corn cobs, cellulose, or sawdust. Collect in suitable and properly labeled containers. For large spills, dike the area to contain the spill. Dilute with large quantities of water. Pump into suitable and properly labeled containers. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Keep people away. Isolate the fire and deny unnecessary entry. Use water spray to cool fire-exposed containers and the fire-affected zone until the fire is out and danger of reignition has passed. Fight the fire from a protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream, which may spread the fire. Move container from the fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Keep fire water out of waterways and sewers to minimize the potential for environmental damage. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing (includes firefighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during firefighting operations. If contact is likely, change to full chemical resistant firefighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight the fire from a remote location. Follow emergency procedures outlined in the Safety Data Sheet carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

Health Information

**Eye contact** – May cause severe irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

**Skin contact** – Avoid all skin contact. Brief contact may cause skin burns. Symptoms may include pain, severe local redness, and tissue damage. May cause more severe response on covered skin (under clothing or gloves). This product is classified as corrosive to the skin according to DOT guidelines. Prolonged or widespread skin contact may result in absorption of harmful amounts. Skin contact may cause an allergic skin reaction. Individuals who have had an allergic skin reaction to a similar material, triethylenetetraamine (TETA), may have an allergic skin reaction to this product. AEEA has caused allergic skin reactions when tested in guinea pigs, and has demonstrated the potential for contact allergy in mice.

**Inhalation** – At room temperature, exposure to vapor is minimal due to low volatility. Vapor from heated material may cause respiratory irritation.

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**Ingestion** – Avoid all oral contact. Swallowing may result in gastrointestinal irritation or ulceration. Swallowing may result in burns of the mouth and throat. Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

**Repeated exposure** – Avoid all oral and dermal contact. In animals, effects have been reported on the gastrointestinal tract and kidney.

**Other** – Has caused birth defects in laboratory animals. Has been toxic to the fetus in laboratory animal tests. In animals studies, AEEA has been shown to interfere with fertility.

For more information, see the relevant Safety Data Sheet.

**Environmental Information**

AEEA is slightly toxic to aquatic organisms on an acute basis (EC_{50}/LC_{50} between 10 and 100 mg/L in the most sensitive species tested). Its bioconcentration potential is low and potential for mobility in soil is very high. AEEA biodegrades readily in the environment and passes the Organisation for Economic Co-operation and Development (OECD) 301F Test for inherent biodegradability.

For more information, see the relevant Safety Data Sheet.

**Physical Hazard Information**

AEEA is stable under recommended storage and use conditions. This product can react with carbon dioxide in the air to form amine-carbamate salts, which tend to plug vent and relief lines, compromising pressure-relief systems and introducing solid contaminants into the storage system. Exposure to elevated temperatures can cause AEEA to decompose. Decomposition products depend on temperature, air supply, and the presence of other materials. Generation of gas during decomposition can cause pressure in closed systems.

Avoid moisture. This material is corrosive when wet. Avoid contact with nitrites, strong acids, and strong oxidizers. AEEA may potentially react with various halogenated organic solvents, resulting in temperature and/or pressure increases. Heating this product above 60ºC (140ºF) in the presence of aluminum can cause corrosion and generation of flammable hydrogen gas. Avoid contact with halogenated hydrocarbons.

For more information, see the relevant Safety Data Sheet.

**Regulatory Information**

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of AEEA. 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.

**Additional Information**

- Contact Us ([www.dow.com/amines/contact/](http://www.dow.com/amines/contact/))

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For more business information about AEEA, visit the Dow Specialty Amines business website at www.dow.com/amines/index.htm or the webpage for AEEA at www.dow.com/amines/prod/ethyl-aeea.htm.

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References

1 Aminoethylethanolamine Product Information, [Technical Data Sheet], The Dow Chemical Company, Form No. 108-01358-1001 AMS
3 Aminoethylethanolamine Material Safety Data Sheet, The Dow Chemical Company
4 Ethyleneamines: Storage and Handling, The Dow Chemical Company, Form No. 108-01350-1101 AMS

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