Product Safety Assessment

Serinol

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Names

- CAS No. 534-03-2
- 2-Aminopropane-1,3-diol
- APD
- Serinol
- 2-Amino-1,3-propanediol

Product Overview

- Serinol is a white, solid amino alcohol with a characteristic odor. It is stable, alkaline (high pH), hygroscopic, and water soluble. For further details, see Product Description.
- Serinol is used as a synthesis intermediate in the health diagnostics sector. For further details, see Product Uses.
- Occupational exposure can occur either in facilities that manufacture serinol or in the various industrial or manufacturing facilities that use serinol. Manufacturing facilities should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit exposure. Dow does not sell serinol for direct consumer use. It is not considered a risk to consumers. For further details, see Exposure Potential.
- Eye contact may cause severe irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Brief skin contact is essentially nonirritating. Inhalation of dust may cause irritation to the nose and throat. Serinol has low toxicity if swallowed. For further details, see Health Information.
- Serinol is readily biodegradable, is unlikely to accumulate in the food chain, is unlikely to be persistent, and is considered practically nontoxic to aquatic organisms on an acute basis. For further details, see Environmental Information.
- Serinol is stable under recommended storage conditions, but can decompose at elevated temperatures. Avoid contact with strong acids, strong oxidizers, and metals such as zinc, aluminum, brass, copper, copper alloys, and galvanized containers. Avoid unintended contact with halogenated hydrocarbons. For further details, see Physical Hazard Information.

Manufacture of Product

- Locations – Foreign affiliates of The Dow Chemical Company manufacture this material at facilities in Germany. It is currently sold only in Italy.

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- **Process** – Serinol is produced by reacting nitromethane with formaldehyde to form 2-nitro-1,3-propanediol; hydrogen is then introduced to form serinol. The reaction sequence is shown below.

\[
\text{\begin{align*}
\text{H}_3\text{C} & \text{N}^+ \text{O}^- + 2 \text{H}_2\text{C}=\text{O} \rightarrow \text{HO-} \text{N}^+ \text{O}^- \text{O}^- \\
& \text{[Catalyst]} \rightarrow \text{HO} \text{HO} \text{HO} \\
& \text{[H}_2\text{; Catalyst]} \rightarrow \text{HO} \text{HO} \text{N}^- \\
\end{align*}}
\]

Nitromethane  Formaldehyde  2-nitro-1,3-propanediol  2-amino-1,3-propanediol

**Product Description**

Serinol is an amino alcohol and the structural analogue to the amino acid, serine. Serinol is a white, solid material with a characteristic odor. It is stable, alkaline (high pH), hygroscopic, and water soluble.

**Product Uses**

Serinol is used as a synthesis intermediate in the health diagnostics sector.

**Exposure Potential**

Serinol is used in the preparation of industrial and consumer products. Based on the uses for this product, the public could be exposed through:

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

- **Consumer exposure to products containing serinol** – Dow does not sell serinol for direct consumer use, so direct contact is unlikely. It is not considered a risk to consumers. See Health Information.

- **Environmental releases** – Releases of serinol to the environment are expected to be limited since the product is used in closed systems. In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface water, or groundwater. Small spills should be removed with a shovel. Eye and respiratory protection are necessary for cleaning up spills and leaks. Serinol is soluble in water and if introduced, it will dissolve and remain in water. Serinol is readily biodegradable, which suggests that it will not persist in water and soil environments and would be rapidly removed by biological wastewater-treatment facilities. Serinol is not likely to accumulate in the food chain and is practically nontoxic 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, evacuate the area. The product should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Only trained and properly protected personnel should be involved in clean-up operations. Eye protection and respiratory protection, including an approved particulate respirator, should be used. See Environmental, Health, and Physical Hazard Information.
In case of fire – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use water spray or fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the fire. Alcohol-resistant foams are preferred. Use of a direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Keep fire water out of waterways and sewers to minimize the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Health Information

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

Skin contact – Brief contact is essentially nonirritating. Prolonged contact may cause slight irritation with local redness, but is unlikely to result in absorption of harmful amounts.

Inhalation – Exposure to vapor is minimal because of the product’s low volatility. Inhalation of dust may cause irritation to the nose and throat.

Ingestion – Serinol has a low toxicity if swallowed.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Environmental Information

Serinol has low volatility and is soluble in water. When introduced to water, the compound will remain in water. It has low potential to bind to soil or sediment.

Serinol is readily biodegradable (OECD 302C screening tests showed 92% biodegradation in 22 days), which suggests that it will not persist in water and soil environments and would be removed by biological wastewater-treatment facilities.

Serinol has a low bioconcentration potential and is not likely to accumulate in the food chain. It is practically nontoxic to aquatic organisms on an acute basis \( \text{LC}_{50}/\text{EC}_{50} > 6,600 \text{ mg/L} \) for the most sensitive species tested.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information

Serinol is stable under recommended storage conditions and normal use. However, elevated temperatures can result in decomposition. Avoid moisture. Avoid contact with strong acids, strong oxidizers, and metals such as zinc, aluminum, brass, copper, copper alloys, and galvanized metals. Avoid unintended contact with halogenated hydrocarbons. Spilling this product on hot, fibrous insulations may reduce the autoignition temperature, increasing the potential for spontaneous combustion.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.
Regulatory Information

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

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Additional Information

- Safety Data Sheet (request from the Dow Customer Information Group at www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/assistance/index.htm)

For more business information about serinol, contact the Customer Information Group or ANGUS Chemical Company by email.

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