Product Safety Assessment

Isopentanoic Acid

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Names
- CAS No. 116-53-0
- EC No. 204-145-2
- Isopentanoic acid
- 2-Methylbutyric acid
- CAS No. 109-52-4
- EC No. 203-677-2
- n-Pentanoic acid
- Valeric acid

Product Overview
- Isopentanoic acid is a colorless, oily liquid with a pungent odor. The Dow Chemical Company (Dow) manufactures isopentanoic acid as an isomeric mixture of valeric acid and 2-methylbutyric acid.¹ For further details, see Product Description.
- Isopentanoic acid is a chemical intermediate to manufacture synthetic lubricants, plasticizers, pharmaceuticals, metallic salts, and vinyl stabilizers. It is also used to extract mercaptans (sulfur-containing compounds) from hydrocarbons.² For further details, see Product Uses.
- Because isopentanoic acid is used to manufacture a broad range of products, worker exposure is possible. Isopentanoic acid is an industrial chemical intermediate, making direct consumer contact unlikely.¹ For further details, see Exposure Potential.
- Eye contact with isopentanoic acid may cause chemical burns resulting in severe irritation with corneal injury. Permanent impairment of vision or blindness may occur. Brief skin contact may cause severe burns along with pain, severe local redness, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts. Inhalation of isopentanoic acid vapor, may cause severe irritation of the nose, throat, and lungs.¹ For further details, see Health Information.
- Isopentanoic acid liquid and vapors are combustible. Isopentanoic acid is stable at typical storage and use temperatures. Avoid contact with oxidizing materials, amines, ammonia, and strong acids and bases.¹ For further details, see Physical Hazard Information.

Manufacture of Product³
- Capacity –Dow manufactures isopentanoic acid at facilities in Texas City, Texas, in the United States.

¹Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
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- **Process** – Dow manufactures isopentanoic acid using the oxo process. 1-Butylene and 2-butylene are reacted with synthesis gas (carbon monoxide and hydrogen mixture) in the presence of a catalyst, yielding valeraldehyde and isovaleraldehyde (2-methylbutyraldehyde). The mixed aldehydes are then oxidized to their corresponding carboxylic acids.

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\begin{align*}
C_3H_6&=CH_2 + C_2H_4=CH_2 + CO/H_2 &\rightarrow& C_3H_6=CH_2-C\!H &+ C_2H_4=CH-C\!H \\
1\text{-Butylene} & 2\text{-Butylene} & \text{Synthesis gas} & \text{Valeraldehyde} & \text{Isovaleraldehyde} \\
\end{align*}
\]

\[
\begin{align*}
C_3H_6&=CH_2-C\!H &+ C_2H_4=CH-C\!H &+ O_2 &\rightarrow& C_3H_6=CH_2-C\!H_2O &+ C_2H_4=CH-C\!H_2O \\
\text{Valeraldehyde} & \text{Isovaleraldehyde} & \text{Oxygen} & \text{Valeric acid} & \text{2-Methylbutanoic acid} \\
\end{align*}
\]

**Product Description**

Isopentanoic acid is a colorless, oily liquid with an unpleasant odor. It is highly corrosive and must be handled with care. Dow manufactures isopentanoic acid as an isomeric mixture of valeric acid (63.0–66.0%) and 2-methylbutyric acid (34.0–37.0%).

**Product Uses**

Isopentanoic acid is an industrial chemical intermediate for the following applications:
- Synthetic lubricants for aviation turbine oils, fire-resistant hydraulic fluids, and refrigerator oils
- Plasticizers
- Pharmaceuticals
- Metallic salts
- Vinyl stabilizers

Other uses include:
- Extractant for mercaptans (sulfur-containing compounds) from hydrocarbons

**Exposure Potential**

Isopentanoic acid is used in the production of industrial and consumer products. Based on the uses for isopentanoic acid, the public could be exposed through:
- **Workplace exposure** – Exposure can occur either in an isopentanoic acid manufacturing facility or in the various industrial or manufacturing facilities that use it. Those working with isopentanoic acid 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 unnecessary exposure. See [Health Information](#).
• **Consumer exposure to products containing isopentanoic acid** – Dow does not sell isopentanoic acid for direct consumer use. Isopentanoic acid is an industrial chemical used to manufacture other products, making direct consumer exposure unlikely. See [Health Information](#).

• **Environmental releases**¹ – 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, collect the 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 spilled material. Isolate the area and evacuate unnecessary personnel. Keep upwind of the spill. Ventilate area. Eliminate all sources of ignition. Pump the recovered material into suitable and properly labeled containers. Use appropriate safety equipment.

• **In case of fire** – Keep people away and deny unnecessary entry. 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 [Safety Data Sheet](#).

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**Health Information**¹

**Eye and Skin Contact** – Eye contact with isopentanoic acid may cause chemical burns resulting in severe irritation with corneal injury. Permanent impairment of vision or blindness may occur. Brief skin contact may cause severe burns along with pain, severe local redness, and tissue damage. Prolonged or widespread skin contact may result in absorption of harmful amounts.

**Inhalation** – Vapor may cause severe irritation of the upper respiratory tract (nose and throat) and lungs. At room temperature, exposure to vapor is minimal due to low volatility.

**Ingestion** – Isopentanoic acid has low toxicity if swallowed. Swallowing may result in irritation or burns of the mouth, throat, and gastrointestinal tract. Based on physical properties, not likely to be an aspiration hazard.

**Cancer and Birth Defect Information** – Valeric acid, the main component of this material, has caused tumors in skin-painting tests in animals. These findings are believed to be secondary to chronic irritation and tissue injury. Studies on the components have reported toxicity to the fetus in lab animals at doses toxic to the mother, but fetal malformations were not reported. Valeric acid, the main component of this material, was predominantly negative in in vitro genetic toxicity studies and negative in animal genetic toxicity studies.

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

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**Environmental Information**¹

This isomeric mixture, is not likely to accumulate in the food chain (bioconcentration potential is low) and is expected to degrade rapidly in the environment. It is considered non toxic to slightly toxic to aquatic organisms on an acute basis.

For more information, see the [Safety Data Sheet](#).
Physical Hazard Information

Isopentanoic acid liquid and vapors are combustible. Isopentanoic acid is thermally stable at typical use temperatures. Elevated temperatures can cause it to decompose. Decomposition depends on temperature, air supply, and the presence of other materials.

Isopentanoic acid is incompatible with oxidizing materials, amines, ammonia, and strong acids and bases and contact should be avoided.

For more information, see the Safety Data Sheet.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of isopentanoic acid. 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 (http://www.dow.com/oxysolvents/contact/index.htm).
- Isopentanoic Acid Technical Data Sheet, The Dow Chemical Company, Form No. 327-00021-0405, September, 2002 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_0119/0901b803801195a0.pdf?filepath=oxysolvents/pdfs/noreg/327-00021.pdf&fromPage=GetDoc)

For more business information about isopentanoic acid, visit Dow's Oxygenated Solvents website: http://www.dow.com/oxysolvents/.

References

1 Isopentanoic Acid Safety Data Sheet, The Dow Chemical Company
2 Isopentanoic Acid Technical Data Sheet, The Dow Chemical Company, Form No. 327-00021-0405
NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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