Product Safety Assessment

**ROCRYL™ 400 Hydroxyethyl Methacrylate Monomer**


Select a Topic:

- Names
- Product Overview
- Manufacture of Product
- Product Description
- Product Uses
- Exposure Potential
- Health Information
- Environmental Information
- Physical Hazard Information
- Regulatory Information
- Additional Information
- References

**Names**

- CAS No. 868-77-9
- EC No. 202-782-2
- ROCRYL™ 400 monomer
- Ethylene glycol methacrylate
- Hydroxyethyl propenate
- Hydroxyethyl methacrylate (HEMA)
- 2-Hydroxyethyl methacrylate
- 2-Propenoic acid, 2-methyl-, 2-hydroxyethyl ester
- Methacrylic acid, 2-hydroxyethyl ester

**Product Overview**

- The chemical name for ROCRYL™ 400 monomer, manufactured by The Dow Chemical Company, is hydroxyethyl methacrylate. It is a clear, colorless liquid with a pungent, sweet odor. The product contains low levels of a polymerization inhibitor along with small amounts of methacrylic acid and ethylene oxide. For further details, see Product Description.
- ROCRYL 400 monomer is used in the manufacture of acrylic polymers for adhesives, printing inks, and coatings for automotive, appliance, and metal applications. For further details, see Product Uses.
- ROCRYL 400 monomer is sold for industrial use only. Occupational exposure is possible at a manufacturing facility, during transport, or at facilities using this material to manufacture other products. Workplace exposure is minimized through engineering controls and the use of personal protective equipment. Consumers may contact this material in trace amounts by using certain products that are manufactured from it. Dow does not sell ROCRYL 400 monomer for any application that would involve implantation in the human body or prolonged contact with internal body fluids or tissues. For further details, see Exposure Potential.
- Eye contact with hydroxyethyl methacrylate monomer may cause mild to severe irritation. Prolonged or repeated skin contact may result in slight irritation. Sensitization or an allergic reaction is possible from skin contact. This material can be harmful if swallowed or absorbed through the skin. Inhalation of vapor or mist from heated material during processing may irritate the nose, throat, and lungs. For further details, see Health Information.
- ROCRYL 400 monomer is readily biodegradable and will not accumulate in the food chain (low bioconcentration potential). It is practically non-toxic to fish and other aquatic organisms on an acute basis (short-term exposure). For further details, see Environmental Information.

©TM Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
• ROCRYL™ 400 monomer is a reactive chemical that must be stored and handled with care. It is stable under recommended storage conditions. Inhibitor is added to this product to prevent polymerization. For the inhibitor to be effective the oxygen concentration in the vapor space must be at least 5%. Avoid contact with acids, bases, oxidizing agents, reducing agents, UV light (ultraviolet light, which is found in sunlight), free-radical initiators, organic peroxides, and mild steel. Avoid excessive heat.\textsuperscript{1,4} For further details, see Physical Hazard Information.

**Back to top**

**Manufacture of Product\textsuperscript{3}**

• **Capacity** – The Dow Chemical Company manufactures ROCRYL™ 400 monomer at facilities in Bayport, Texas, USA..

• **Process** – ROCRYL 400 monomer is manufactured by reacting methacrylic acid with ethylene oxide as shown below.

\[
\begin{align*}
\text{Methacrylic acid} & \quad + \quad \text{Ethylene oxide} \\
\text{H}_2\text{C} & \quad \text{C} \quad \text{C} \quad \text{H}_3 & \quad \text{O} \\
& \quad \text{OH} \quad + \quad \text{H}_2\text{C} - \text{C} \quad \text{H}_2 \\
\rightarrow \quad \text{CH}_3 & \quad \text{C} \quad \text{O} \\
& \quad \text{O} - \text{CH}_2\text{CH}_2\text{OH} \\
\end{align*}
\]

**Back to top**

**Product Description\textsuperscript{1,2}**

ROCRYL™ 400 monomer is a clear, colorless liquid with a pungent, sweet odor. It belongs to a class of chemicals known as esters of methacrylic acid. It easily dissolves in water and has relatively low volatility (doesn’t evaporate easily). ROCRYL 400 monomer is composed of hydroxyethyl methacrylate along with small amounts of methacrylic acid, ethylene oxide, and the polymerization inhibitor methoxyphenol (MEHQ). It copolymerizes readily with a wide variety of monomers, and the added hydroxyl groups improve adhesion to surfaces, incorporate cross-link sites, and impart corrosion, fogging, and abrasion resistance, as well as contribute to low odor, color, and volatility.

**Back to top**

**Product Uses\textsuperscript{2,3,5}**

ROCRYL™ 400 monomer is used in the manufacture of acrylic polyols, caprolactone monomers, printing plates, and finish coatings for motor vehicles, appliances, and metals. Other end uses include adhesives, sealants, and binders. Dow does not sell ROCRYL 400 monomer for artificial fingernail (acrylic nail) applications, dental adhesives, dental prosthetics, or for any application that would result in implantation or prolonged contact within the human body.

**Back to top**

**Exposure Potential\textsuperscript{1,3}**

ROCRYL™ 400 monomer is used in the production of industrial and consumer products. Based on the uses for this material, the public could be exposed through:

\[\text{Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow}\]
• **Workplace exposure** – Exposure can occur either in a manufacturing facility, during transport, or in the various industrial or manufacturing facilities that use it. This material is produced, distributed, stored, and consumed in closed systems. Those working with ROCRYL™ 400 monomer 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 ROCRYL 400 monomer** – Dow does not sell ROCRYL 400 monomer for direct consumer use, but it is used to make products handled by consumers, such as acrylic paints and adhesives. Residual levels of hydroxyethyl methacrylate in consumer products would be very low and significant contact is unlikely. Always read the product information before use and follow the label/use instructions. Acrylic and methacrylic polymers are used safely in a wide variety of personal-care and hygiene products. Dow does not sell ROCRYL 400 monomer for artificial fingernail applications, dental adhesives, dental prosthetics, or for any application that would result in implantation or prolonged contact within the human body. See **Health Information**.

• **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. The low volatility and high water solubility makes this material tend to accumulate in water or soil depending on the release site. It is readily biodegradable and will be removed by wastewater-treatment facilities. It 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, contain it immediately with inert materials such as sand or earth. Remove all sources of ignition. Wear approved self-contained breathing apparatus (SCBA) and appropriate protective clothing. Transfer liquids and solid diking material to separate suitable containers for recovery or disposal. Contaminated monomer may be unstable. Add inhibitor (phenothiazine; PTZ) to prevent polymerization. Absorbent can act as a contaminant and remove inhibitor from the liquid monomer. Avoid freestanding monomer with absorbent and add inhibitor to stabilize against polymerization. See **Environmental**, **Health**, and **Physical Hazard Information**.

• **In case of fire** – Keep people away. Isolate the fire and deny unnecessary entry. Eliminate all sources of ignition immediately. Heat can cause polymerization. Heated containers can explode. Use water spray, dry-powder or carbon-dioxide extinguishers, or alcohol-resistant foam to fight the fire. A direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Fight advanced fires from a protected location if possible. During a fire, irritating and highly toxic gases and/or fumes may be generated during combustion or decomposition. 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](mailto:CustomerInformationGroup@Dow.com).

**Health Information**

**Eye contact** – Contact with liquid, heated vapor, or mist may result in mild to severe eye irritation.

**Skin contact** – Prolonged or repeated contact may result in slight irritation. Prolonged skin contact is unlikely to result in absorption of harmful amounts. In humans, symptoms may include: Diarrhea. Nausea and/or vomiting. Symptoms may include as tingling, numbness or pain in the extremities. Sensitization (allergic reaction upon repeated contact) is possible.

**Ingestion** – Harmful effects not anticipated from swallowing small amounts of this material.
**Inhalation** – At room temperature, exposure to vapor is minimal. However, inhalation of vapor or mist may cause irritation of the nose and throat.

**Repeated exposure** – In animal tests, prolonged or repeated overexposure resulted in adverse effects on the kidney.

**Other information** – This product contains very low levels of ethylene oxide (less than or equal to 10 parts per million). Ethylene oxide is a suspected human carcinogen. Consumer products made from hydroxyethyl methacrylate would not be expected to contain any free ethylene oxide. In animal studies, this product did not interfere with reproduction or fetal development. In vitro genetic toxicity studies were negative in some cases and positive in others and were negative in animal genetic toxicity studies.

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

**Environmental Information**

ROCRYL™ 400 monomer has low volatility, meaning it doesn’t readily evaporate at ambient temperature. It is completely soluble in water. If released to water, it would stay in the water. If released to air, this material would partition between water and soil, with little remaining in the air. ROCRyl 400 monomer is unlikely to persist in the environment. It is readily biodegradable, which suggests it will be rapidly and completely removed from water and soil, including biological wastewater-treatment facilities. It is rapidly degraded by sunlight. ROCRyl 400 monomer is not a hazardous air pollutant (HAP) and does not have SARA 313 content.

ROCRYL 400 monomer is unlikely to accumulate in the food chain (low bioconcentration potential) and is slightly toxic to fish and other aquatic organisms on an acute basis (short-term exposure).

The Organisation for Economic Co-operation and Development (OECD) SIDS Initial Assessment Profile for hydroxyethyl methacrylate concluded that based on its characteristics, this chemical is of low priority for further work.

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

**Physical Hazard Information**

ROCRYL™ 400 monomer is a reactive chemical that must be stored and handled with care. It is stable under recommended storage conditions. This product contains an inhibitor to stabilize it against polymerization during shipment and storage. Do not store this material in an oxygen-free environment. The effectiveness of this inhibitor is dependent on the presence of dissolved oxygen. To maintain sufficient dissolved oxygen in the liquid, the monomer must be stored with an oxygen concentration of 5% or more in the vapor space. Hazardous polymerization could occur not only by depletion of inhibitor or lack of sufficient oxygen, but by overheating or the presence of chemical contaminants. An uncontrolled polymerization (chemical reaction) may produce a rapid release of energy with the potential of an explosion of closed containers. Store this material in a cool place out of direct sunlight for no longer than one year.

Avoid contact with acids, bases, oxidizing agents, reducing agents, UV light (sunlight), free-radical initiators, organic peroxides, and mild steel. Avoid excessive heat.

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 ROCRYL™ 400 monomer. 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

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (www.dow.com/assistance/thoughts.htm)


Reference

1 ROCRyl™ 400 (HEMA) Monomer LA Safety Data Sheet, The Dow Chemical Company.
2 ROCRyl 400 hydroxyethyl methacrylate (HEMA) web page.
4 Safe Handling, The Dow Chemical Company.
5 Estimates by The Dow Chemical Company.
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.

The information herein is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Dow be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information herein or the product to which that information refers.

Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Dow makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Dow makes no commitment to update or correct any information that appears on the Internet or on its World-Wide Web server. The information contained in this document is supplemental to the Internet Disclaimer, www.dow.com/homepage/term.asp.

Back to top

Form No. 233-00777-MM-1115X