

1. Material Identification

Product Name : Acrylic Acid

Catalog Number : io-406945

CAS Number : 79-10-7

Identified uses : Laboratory chemicals, manufacture of chemical compounds

Company : IonZ

>> R&D Use only

2. Hazards Identification

GHS Classification:

Flammable liquid (category 2)

Acute toxicity, oral (Category 3)

Acute toxicity, dermal (Category 3)

Acute toxicity, inhalation (Category 3)

Specific target organ toxicity, single exposure (Category 1)

Pictogram(s)



GHS Hazard Statements

>> H226: Flammable liquid and vapor [Warning Flammable liquids]

>> H302: Harmful if swallowed [Warning Acute toxicity, oral]

>> H312: Harmful in contact with skin [Warning Acute toxicity, dermal]

>> H314: Causes severe skin burns and eye damage [Danger Skin corrosion/irritation]

>> H332: Harmful if inhaled [Warning Acute toxicity, inhalation]

>> H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

Precautionary Statement Codes

>> P210, P233, P240, P241, P242, P243, P260, P261, P264, P270, P271, P273, P280, P301+P317, P301+P330+P331, P302+P352, P302+P361+P354, P303+P361+P353, P304+P340, P305+P354+P338, P316, P317, P321, P330, P362+P364, P363, P370+P378, P391, P403+P235, P405, and P501

Note

>> This chemical does not meet GHS hazard criteria for < 0.1% (2 of 4724) of reports.

NFPA 704 Diamond



NFPA Health Rating

>> 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA Fire Rating

>> 2 – Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air.

NFPA Instability Rating

>> 2 – Materials that readily undergo violent chemical changes at elevated temperatures and pressures.

DOT Hazard Classification:

The U.S. Department of Transportation (DOT) categorizes hazardous materials into nine hazard classes for transportation purposes. This section provides the summary from the Hazardous Materials Table of the 49 eCFR § 172.101. For details, please visit <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-172>

Marine Pollutant Name

>> Acroleic acid, stabilized

Hazard Class

>> Marine pollutant

Placard/Label(s)

Substance (Descriptions/Shipping Name)

>> Acrylic acid, stabilized

DOT ID (UN/NA Number)

>> UN2218

Hazard Class/Division

>> Class 8 Corrosive material (49 eCFR § 173.136)

Label Codes

>> Class 8 Corrosive material (49 eCFR § 173.136)

>> Class 3 Flammable and combustible liquid (49 eCFR § 173.120)

Packing Group

>> PG II: the degree of danger presented by the material is medium

>> For more information about the packing group assignment, please visit 49 eCFR § 173

Health Hazards:

>> May burn skin or eyes upon short contact. INHALATION: eye and nasal irritation and lacrimation. INGESTION: may cause severe damage to the gastrointestinal tract. (USCG, 1999)

ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> May cause toxic effects if inhaled or ingested.
- >> Contact with substance may cause severe burns to skin and eyes.
- >> Fire will produce irritating, corrosive and/or toxic gases.
- >> Vapors may cause dizziness or asphyxiation, especially when in closed or confined areas.
- >> Runoff from fire control or dilution water may cause environmental contamination.
- >> Special Hazards of Combustion Products: Toxic vapors are generated when heated
- >> Behavior in Fire: May polymerize and explode (USCG, 1999)

ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> Flammable/combustible material.
- >> May be ignited by heat, sparks or flames.
- >> Vapors may form explosive mixtures with air.
- >> Vapors may travel to source of ignition and flash back.
- >> Most vapors are heavier than air. They will spread along the ground and collect in low or confined areas (sewers, basements, tanks, etc.).
- >> Vapor explosion hazard indoors, outdoors or in sewers.
- >> Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
- >> Runoff to sewer may create fire or explosion hazard.
- >> Containers may explode when heated.
- >> Many liquids will float on water.
- >> Flammable. Many reactions may cause fire or explosion. Gives off irritating or toxic fumes (or gases) in a fire. Above 48Â°C explosive vapour/air mixtures may be formed.

3. Composition/Information On Ingredients

Chemical name : Acrylic Acid
CAS Number : 79-10-7
Molecular Formula : C₃H₄O₂
Molecular Weight : 72.0600 g/mol

4. First Aid Measures

First Aid:

- >> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.
- >> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.
- >> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an

unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

- >> INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. Transport the victim IMMEDIATELY to a hospital. (NTP, 1992)

ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> General First Aid:
- >> Call 911 or emergency medical service.
- >> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.
- >> Move victim to fresh air if it can be done safely.
- >> Administer oxygen if breathing is difficult.
- >> If victim is not breathing:
- >> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingested or inhaled the substance.
- >> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).
- >> If no pulse detected or no respiratory medical device available, provide continuous compressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.
- >> Remove and isolate contaminated clothing and shoes.
- >> For minor skin contact, avoid spreading material on unaffected skin.
- >> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.
- >> For severe burns, immediate medical attention is required.
- >> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.
- >> Keep victim calm and warm.
- >> Keep victim under observation.
- >> For further assistance, contact your local Poison Control Center.
- >> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.
- >> Specific First Aid:
- >> For corrosives, in case of contact, immediately flush skin or eyes with running water for at least 30 minutes. Additional flushing may be required.
- >> In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- >> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

First Aid Measures

Inhalation First Aid

- >> Fresh air, rest. Half-upright position. Refer for medical attention.

Skin First Aid

- >> Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention .

Eye First Aid

- >> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Ingestion First Aid

- >> Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

5. Fire Fighting Measures

- >> Flash back possible over considerable distance.
- >> Excerpt from ERG Guide 132 [Flammable Liquids – Corrosive; polymerization hazard]:
- >> Some of these materials may react violently with water.
- >> SMALL FIRE: Dry chemical, CO₂, water spray or alcohol-resistant foam.
- >> LARGE FIRE: Water spray, fog or alcohol-resistant foam. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal. Do not get water inside containers.
- >> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)
- >> Use water spray, alcohol-resistant foam, powder, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.

6. Accidental Release Measures

Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

- >> Excerpt from ERG Guide 132 [Flammable Liquids – Corrosive; polymerization hazard]:
- >> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- >> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.
- >> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Evacuation: ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> Immediate precautionary measure
- >> Isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- >> Spill
- >> For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.
- >> Fire
- >> If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

- >> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- >> Keep unauthorized personnel away.
- >> Stay upwind, uphill and/or upstream.
- >> Ventilate closed spaces before entering, but only if properly trained and equipped.

Spill or Leak: ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
- >> All equipment used when handling the product must be grounded.
- >> Do not touch or walk through spilled material.
- >> Stop leak if you can do it without risk.
- >> Prevent entry into waterways, sewers, basements or confined areas.
- >> A vapor-suppressing foam may be used to reduce vapors.
- >> Absorb with earth, sand or other non-combustible material.
- >> For hydrazine, absorb with DRY sand or inert absorbent (vermiculite or absorbent pads).
- >> Use clean, non-sparking tools to collect absorbed material.
- >> Large Spill
- >> Dike far ahead of liquid spill for later disposal.
- >> Water spray may reduce vapor, but may not prevent ignition in closed spaces.

7. Handling And Storage

Safe Storage:

- >> Fireproof. Separated from strong oxidants, strong bases, strong acids and food and feedstuffs. Keep in the dark. Store only if stabilized. Store in an area without drain or sewer access. Storage conditions may vary according to the type of inhibitor used. Refer to the manufacturer's instructions for proper storage conditions.

Storage Conditions:

- >> Acrylic acid should be stored in a detached, cool, well-ventilated, non-combustible place, and its containers should be protected against physical damage. Acrylic acid can be stored only in vessels lined with glass, stainless steel, aluminum, or polyethylene. In order to inhibit polymerization during transport and storage, 200 ppm MeHQ (the monomethyl ether of hydroquinone) is commonly added to acrylic acid by the manufacturer. The presence of oxygen is required for the inhibitor to be effective. A major concern during the storage of acrylic acid is the avoidance of elevated temperatures as well as freezing, since both can lead to a failure of the inhibitor system. Ideally acrylic acid should be stored within a temperature range of 15 to 25 °C.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

- >> 2 ppm (6 mg/m³)
- >> TWA 2 ppm (6 mg/m³) [skin]
- >> none See Appendix G
- >> 2.0 [ppm]
- >> 2 ppm as TWA; (skin); A4 (not classifiable as a human carcinogen).

TLV-TWA (Time Weighted Average)

- >> 2 ppm [1986]

EU-OEL

- >> 29 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

- >> 30 mg/m

Emergency Response: ERG2024, Guide 132P (Acrylic acid, stabilized)

- >> Some of these materials may react violently with water.

- >> Small Fire
- >> Dry chemical, CO₂, water spray or alcohol-resistant foam.
- >> Large Fire
- >> Water spray, fog or alcohol-resistant foam.
- >> If it can be done safely, move undamaged containers away from the area around the fire.
- >> Dike runoff from fire control for later disposal.
- >> Do not get water inside containers.
- >> Fire Involving Tanks, Rail Tank Cars or Highway Tanks
- >> Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.
- >> Cool containers with flooding quantities of water until well after fire is out.
- >> Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- >> ALWAYS stay away from tanks in direct contact with flames.
- >> For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- >> ERPG-1: 1 ppm – one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]
- >> ERPG-2: 50 ppm – one hour exposure limit: 2 = impaired ability to take protective action [AIHA]
- >> ERPG-3: 250 ppm – one hour exposure limit: 3 = life threatening health effects [AIHA]

Inhalation Risk:

- >> A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20Â °C , on spraying or dispersing much faster.

Effects of Short Term Exposure:

- >> The substance is corrosive to the eyes and skin. Corrosive on ingestion. The vapour is severely irritating to the eyes and respiratory tract.

Effects of Long Term Exposure:

- >> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the upper respiratory tract and lungs. This may result in reduced lung function and hyperreactivity of the airways.

Fire Prevention:

Precautionary measures to prevent fires from this chemical.

- >> NO open flames, NO sparks and NO smoking. Above 48Â °C use a closed system, ventilation and explosion-proof electrical equipment. Vapours will be uninhibited and may polymerize in exhaust or ventilation facilities with risk of breakdown.

Exposure Prevention:

Prevention measures to avoid exposure to this chemical through various routes (for example, ingestion, inhalation, skin contact, and eye contact).

- >> STRICT HYGIENE!

Inhalation Prevention:

Precautionary measures to avoid inhalation of this chemical.

- >> Use ventilation, local exhaust or breathing protection.

Skin Prevention:

Precautionary measures to avoid skin exposure to this chemical.

- >> Protective gloves. Protective clothing.

Eye Prevention:

Precautionary measures to avoid eye exposure to this chemical.

>> Wear face shield or eye protection in combination with breathing protection.

Ingestion Prevention:

Precautionary measures to avoid ingestion of this chemical.

>> Do not eat, drink, or smoke during work.

Exposure Control and Personal Protection

Protective Clothing: ERG2024, Guide 132P (Acrylic acid, stabilized)

>> Wear positive pressure self-contained breathing apparatus (SCBA).

>> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.

>> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

Maximum Allowable Concentration (MAK)

>> 10.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 72.06

Exact Mass:

>> 72.021129366

Physical Description:

>> Acrylic acid is a colorless liquid with a distinctive acrid odor. Flash point 130 °F. Boiling point 286 °F. Freezing point 53 °F. Corrosive to metals and tissue. Prolonged exposure to fire or heat can cause polymerization. If polymerization takes place in a closed container, violent rupture may occur. The inhibitor (usually hydroquinone) greatly reduces the tendency to polymerize.

>> COLOURLESS LIQUID WITH PUNGENT ODOUR.

Color/Form:

>> Acrid liquid

Odor:

>> Acrid odor and fumes

Boiling Point:

>> 286 °F at 760 mmHg (NTP, 1992)

>> 141Â °C

Melting Point:

>> 55 °F (NTP, 1992)

>> 14Â °C

Flash Point:

>> 130 °F (NTP, 1992)

>> 48–55Â °C c.c.

Solubility:

>> greater than or equal to 100 mg/mL at 63 °F (NTP, 1992)

>> Solubility in water: miscible

Density:

>> 1.0497 at 68 °F (USCG, 1999) – Denser than water; will sink

>> Relative density (water = 1): 1.05

Vapor Density:

>> 2.5 (NTP, 1992) – Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 2.5

Vapor Pressure:

>> 3.2 mmHg at 68 °F ; 5 mmHg at 81.1 °F (NTP, 1992)

>> Vapor pressure, Pa at 20 °C: 413

LogP:

>> 0.36 (estimated)

Stability/Shelf Life:

>> Stable under recommended storage conditions. Contains the following stabilizer(s): Mequinol (>=0.018 - <=0.02%)

Autoignition Temperature:

>> 820 °F (USCG, 1999)

>> 395 °C

Decomposition:

>> Acrylic acid rapidly decomposes in the atmosphere by photochemical attack on the double bond.

Corrosivity:

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Corrosive to metals

Heat of Combustion:

>> -1368.4 kJ/mole

Heat of Vaporization:

>> 10,955.1 gcal/gmole

Surface Tension:

>> 28.1 dynes/cm at 30 °C

Polymerization:

Polymerization is a process of reacting monomer molecules together in a chemical reaction to form polymer chains or three-dimensional networks.

>> May undergo exothermic polymerization at room temperature.

Odor Threshold:

>> Odor Threshold Low: 0.09 [ppm]

>> Odor Threshold High: 1.0 [ppm]

>> Detection odor threshold from AIHA (mean = 0.092 ppm)

Refractive Index:

>> Index of refraction: 1.4224 at 20 °C/D

Dissociation Constants:

pKa

>> 4.26 (at 25 °C)

>> pKa = 4.25 at 25 °C

10. Stability And Reactivity

>> Flammable. Soluble in water. The presence of water, due to different solubilities of the acid and inhibitor (partitioning one from the other), may initiate polymerization.

>> Polymerizable

Peroxide Forming Chemical:

Peroxide-forming chemicals (PFCs) are chemicals that can "auto-oxidize" with atmospheric oxygen under ambient conditions to form organic peroxides (contains an -O-O- bond). Peroxide formation can be initiated by exposure to air,

self-polymerization, or solvent impurities. Once formed, organic peroxides are sensitive to thermal or mechanical shock and can be violently explosive in concentrated solutions or as solids.

Chemical

>> Acrylic Acid

Class (* = UMN Designation)

>> C: Compounds that autopolymerize due to peroxide formation if inhibitors are depleted or not present

Reference(s)

>> Kelly

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Acrylic acid is a volatile colorless liquid. It is used in the manufacture of plastics, molding powder for signs, construction units, decorative emblems and insignias, polymer solutions for coatings applications, emulsion polymers, paints formulations, leather finishing, and paper coatings; also used in medicine and dentistry for dental plates, artificial teeth, and orthopedic cement. Commercial glacial acrylic acid contains polymer formation inhibitor hydroquinone monomethyl ether (200 ppm). HUMAN STUDIES: Regardless of the route of exposure, acrylic acid is rapidly absorbed and metabolized. Owing to its rapid metabolism and elimination, the half-life of acrylic acid is short (minutes) and therefore it has no potential for bioaccumulation. The substance is corrosive to the eyes, skin and respiratory tract, and also upon ingestion. Inhalation of the substance may cause lung edema. The symptoms of lung edema often do not become manifest until a few hours have passed, and they are aggravated by physical effort. ANIMAL STUDIES: Although a wide range of LD50 values has been reported, most data indicate that acrylic acid is of low to moderate acute toxicity by the oral route and moderate acute toxicity by the inhalation or dermal route. Acrylic acid is corrosive or irritating to skin and eyes, and is a strong irritant to the respiratory tract. Skin sensitization have been reported. Available reproduction studies indicate that acrylic acid is not teratogenic and has no effect on reproduction. Both positive and negative results have been obtained in in vitro genotoxicity tests. No experimental data relevant to the carcinogenicity of acrylic acid were available. ECOTOXICITY STUDIES: The toxicity of acrylic acid to bacteria and soil microorganisms is low. Algae are the most sensitive group of aquatic organisms. Acrylic acid reduces or eliminates bacterial populations in penguins receiving dietary exposure.

EPA Provisional Peer-Reviewed Toxicity Values:

This section provides the EPA Provisional Peer-Reviewed Toxicity Values (PPRTVs) and links of related assessment documents.

Chemical Substance

>> Acrylic Acid

Reference Dose (RfD), Subchronic

>> 2×10^{-1} mg/kg-day

Reference Concentration (RfC), Subchronic

>> 2×10^{-4} mg/m³

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> Inadequate information to assess carcinogenic potential

Last Revision

>> 2010

RAIS Toxicity Values:

This section provides the Chemical toxicity information from the Risk Assessment Information System.

Inhalation Acute Reference Concentration (RfCa) (mg/m³)

>> 6

Inhalation Acute Reference Concentration Reference

>> CALEPA

Inhalation Chronic Reference Concentration (RfC) (mg/m³)

>> 0.0002

Inhalation Chronic Reference Concentration Reference

>> PPRTV Memo

Inhalation Subchronic Reference Concentration (RfCs) (mg/m³)

>> 0.0002

Inhalation Subchronic Reference Concentration Reference

>> PPRTV Current

Oral Chronic Reference Dose (RfDoc) (mg/kg-day)

>> 0.5

Oral Chronic Reference Dose Reference

>> IRIS Current

Oral Subchronic Chronic Reference Dose (RfDos) (mg/kg-day)

>> 0.2

Oral Subchronic Chronic Reference Dose Reference

>> PPRTV Current

Evidence for Carcinogenicity:

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> Evaluation: No epidemiological data relevant to the carcinogenicity of acrylic acid were available. No experimental data relevant to the carcinogenicity of acrylic acid were available. Overall evaluation: Acrylic acid is not classifiable as to its carcinogenicity in humans (Group 3).

Carcinogen Classification:

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

IARC Carcinogenic Agent

>> Acrylic acid

IARC Carcinogenic Classes

>> Group 3: Not classifiable as to its carcinogenicity to humans

IARC Monographs

>> Volume 19: (1979) Some Monomers, Plastics and Synthetic Elastomers, and Acrolein

>> Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print)

>> Volume 71: (1999) Re-evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide (Part 1, Part 2, Part 3)

Exposure Routes:

>> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

>> inhalation, skin absorption, ingestion, skin and/or eye contact

Signs and Symptoms:

Symptoms of exposure to this chemical through various routes (for example, ingestion, inhalation, skin contact, and eye contact).

Inhalation Exposure

>> Cough. Sore throat. Burning sensation. Shortness of breath. Laboured breathing.

Skin Exposure

>> MAY BE ABSORBED! Redness. Pain. Serious skin burns.

Eye Exposure

>> Redness. Pain. Corneal damage.

Ingestion Exposure

- >> Burning sensation. Diarrhoea. Shock or collapse. Unconsciousness.
- >> irritation eyes, skin, respiratory system; eye, skin burns; skin sensitization; In Animals: lung, liver, kidney injury

Target Organs:

Organs that are affected by exposure to this chemical. Information in this section reflects human data unless otherwise noted.

- >> Developmental
- >> Nervous
- >> Respiratory
- >> Eyes, skin, respiratory system

Adverse Effects:

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

- >> Dermatotoxin – Skin burns.
- >> Toxic Pneumonitis – Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.
- >> ACGIH Carcinogen – Not Classifiable.

Toxicity Data:

- >> LC50 (rat) = 1200 ppm/4h

Interactions:

- >> The purpose of this work was to investigate the relationship between the feed composition of 2-hydroxyethyl methacrylate (HEMA)/acrylic acid (AAc) and hydrogel material compatibility towards ocular anterior segment tissues, particularly the corneal endothelium. The monomer solutions of HEMA and AAc were mixed at varying volume ratios of 92:0, 87:5, 82:10, 77:15, and 72:20, and were subjected to UV irradiation. Then, the 7-mm-diameter membrane implants made from photopolymerized materials were placed into the ocular anterior chamber for 4 days and assessed by biomicroscopic examinations, corneal thickness measurements, and quantitative real-time reverse transcription polymerase chain reaction analyses. The poly(HEMA-co-AAc) implants prepared from the solution mixture containing 0–10 vol.% AAc displayed good biocompatibility. However, with increasing volume ratio of AAc and HEMA from 15:77 to 20:72, the enhanced inflammatory response, decreased endothelial cell density, and increased ocular score and corneal thickness were observed, probably due to the influence of surface charge of copolymer membranes. On the other hand, the ionic pump function of corneal endothelium exposed to photopolymerized membranes was examined by analyzing the Na(+),K(+)-ATPase alpha 1 subunit (ATP1A1) expression level. The presence of the implants having higher amount of AAc incorporated in the copolymers (i.e., 15.1 to 24.7 μmol) and zeta potential (i.e., -38.6 to -56.5 mV) may lead to abnormal transmembrane transport. It is concluded that the chemical composition of HEMA/AAc has an important influence on the corneal tissue responses to polymeric biomaterials.

Antidote and Emergency Treatment:

- >> Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Organic acids and related compounds/

Human Toxicity Excerpts:

- >> /HUMAN EXPOSURE STUDIES/ Allergic contact dermatitis caused by (meth)acrylates is well known, both in occupational and in non-occupational settings. Contact hypersensitivity to electrocardiogram (ECG) electrodes containing (meth)acrylates is rarely reported. To report the first case of contact dermatitis caused by acrylic acid impurity in ECG electrodes. Patch tests were performed with separate components of electrodes and some (meth)acrylates. This was followed by high-performance liquid chromatography of electrode hydrogel. The patient was contact-allergic to electrode hydrogel but not to its separate constituents. Positive reactions were observed to 2-hydroxyethyl methacrylate (2-HEMA), 2-hydroxypropyl methacrylate (2-HPMA) and ethyleneglycol dimethacrylate (EGDMA). Subsequent analysis showed that the electrode hydrogel contained acrylic acid as an impurity. The latter was subsequently patch tested, with a positive result. The sensitization resulting from direct contact with ECG electrodes was caused by acrylic acid, present as an impurity in ECG electrodes. Positive reactions to 2-HEMA, 2-HPMA and EGDMA are considered to be cross-reactions.

Non-Human Toxicity Excerpts:

- >> /LABORATORY ANIMALS: Acute Exposure/ ... Male Sprague-Dawley rats /were dosed/ orally in quadruplicate with 4, 40, 400, and 1000 mg/kg acrylic acid or 2, 20, 100, or 200 mg/kg ethyl acrylate in 0.5% methylcellulose at a volume of 5 mL/kg with and without pretreatment with the carboxylesterase inhibitor tri-o-cresyl phosphate [TOCP]. Control

animals were given 2 mL/kg corn oil with and without pretreatment. The animals were killed 1 hour after dosing. A "pronounced increase" in glandular and nonglandular stomach weights, edema, and hemorrhage were observed with > 40 mg/kg acrylic acid. Acrylic acid, > 4 mg/kg, significantly depleted nonprotein sulfhydryl [NPSH] content in the glandular stomach, but no significant effect on NPSH in the blood or liver was observed. Pretreatment with TOCP did not have a significant effect on stomach weight or NPSH content. With ethyl acrylate, a significant increase in forestomach weight was observed with the 200-mg/kg dose; no significant change in glandular stomach weight was observed. Treatment with TOCP enhanced the increase in forestomach weight. A linear depletion of NPSH content of the forestomach and glandular stomach was observed 1 hour after dosing with 2 and 20 mg/kg; NPSH content did not change with doses of 100 or 200 mg/kg. No significant dose-dependent effect of ethyl acrylate on NPSH concentration in the blood and liver was seen. Pretreatment with TOCP did not affect the depletion of NPSH content in the glandular stomach or forestomach; however, 100 and 200 mg/kg ethyl acrylate did induce a significant depletion of hepatic NPSH concentration.

Non-Human Toxicity Values:

>> LD50 Rat oral 193 mg/kg

EFSA OpenFoodTox:

Openfoodtox is a compilation of chemical and toxicological information on chemicals assessed by EFSA since its creation and included in already published scientific opinions.

EFSA Outputs:

EFSA publications and DOI for the given substance.

EFSA Genotoxicity:

EFSA Genotoxicity information.

12. Ecological Information

Resident Soil (mg/kg)

>> 2.00e+01

Industrial Soil (mg/kg)

>> 8.30e+01

Resident Air (ug/m3)

>> 2.10e-01

Industrial Air (ug/m3)

>> 8.80e-01

Tapwater (ug/L)

>> 4.20e-01

Risk-based SSL (mg/kg)

>> 8.5e-05

Chronic Oral Reference Dose (mg/kg-day)

>> 5.00e-01

Chronic Inhalation Reference Concentration (mg/m3)

>> 2.00e-04

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 1.09e+05

ICSC Environmental Data:

- >> The substance is harmful to aquatic organisms.

Animal Concentrations:

Concentrations of this compound in animals.

- >> Acrylic acid has been reported to occur naturally in following species of marine algae: 9 species of Chlorophyceae, 10 of Rhodophyceae and 11 of Phaeophyceae ... it has been found in rumen fluid of sheep ..

13. Disposal Considerations

Spillage Disposal

- >> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Ventilation. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Disposal Methods

- >> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U008, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.
- >> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.
- >> Burn in approved incinerator. Recommendable methods: Incineration. Not recommendable methods: Landfill and evaporation. Peer-review: Small amounts: Dissolve in large amounts of water and wash down sewer. (Peer-review conclusions of an IRPTC expert consultation (May 1985))
- >> Acrylic acid is a waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration.
- >> For more Disposal Methods (Complete) data for Acrylic acid (8 total), please visit the HSDB record page.

14. Transport Information

DOT

Acrylic Acid

8

UN Pack Group: II

Reportable Quantity of 5000 lb or 2270 kg

IATA

Acrylic Acid

8, 3

UN Pack Group: II

15. Regulatory Information

TSCA Requirements:

This section provides information on requirements concerning this chemical under the Toxic Substances Control Act (TSCA) of 1976. TSCA provides EPA with authority to require reporting, record-keeping and testing requirements, and

restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.

>> A testing consent order is in effect for acrylic acid for health effects testing. Federal Register Publication Date: 3/4/92.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: 2-Propenoic acid

California Safe Cosmetics Program (CSCP) Reportable Ingredient

>> Hazard Traits – Dermatotoxicity; Nephrotoxicity and Other Toxicity to the Urinary System; Respiratory Toxicity

>> Authoritative List – CA TACs; OEHHA RELs

>> Report – if used as a fragrance or flavor ingredient

EFSA Legal Basis

>> Regulation (EC) No 1935/2004 (amended)

REACH Registered Substance

>> Status: Active Update: 04-05-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/15803>

>> Status: Active Update: 25-11-2010 <https://echa.europa.eu/registration-dossier/-/registered-dossier/13907>

>> Status: No longer Valid Update: 09-10-2009 <https://echa.europa.eu/registration-dossier/-/registered-dossier/1609>

>> Status: Active Update: 24-01-2013 <https://echa.europa.eu/registration-dossier/-/registered-dossier/6635>

New Zealand EPA Inventory of Chemical Status

>> Viscalex HV 30: Does not have an individual approval but may be used as a component in a product covered by a group standard. It is not approved for use as a chemical in its own right.

New Zealand EPA Inventory of Chemical Status

>> Acrylic acid: Does not have an individual approval but may be used under an appropriate group standard

New Jersey Worker and Community Right to Know Act

>> The New Jersey Worker and Community Right to Know Act requires public and private employers to provide information about hazardous substances at their workplaces. (N.J.S.A. 34:5A-1 et. seq.)

16. Other Information

Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

>> Hazardous decomposition products formed under fire conditions. – Carbon oxides

Other Safety Information

Chemical Assessment

>> IMAP assessments – 2-Propenoic acid: Human health tier II assessment

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. lonz is not responsible for any damages resulting from handling or contact with the product incorrectly."