ionz

SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Acetic Acid
Catalog Number : io-1657
CAS Number : 64-19-7
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)

Note

>> Pictograms displayed are for > 99.9% (5069 of 5072) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for < 0.1% (3 of 5072) of reports.

Pictogram(s)

GHS Hazard Statements

>> H226 (99.7%): Flammable liquid and vapor [Warning Flammable liquids]

>> H314 (> 99.9%): Causes severe skin burns and eye damage [Danger Skin corrosion/irritation]

>> H318 (14.7%): Causes serious eye damage [Danger Serious eye damage/eye irritation]

Precautionary Statement Codes

>> P210, P233, P240, P241, P242, P243, P260, P264, P264+P265, P280, P301+P330+P331, P302+P361+P354, P303+P361+P353, P304+P340, P305+P354+P338, P316, P317, P321, P363, P370+P378, P403+P235, P405, and P501

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

>> 0 - Materials that in themselves are normally stable, even under fire conditions.

EPA Safer Chemical:

EPA labels products so that consumers can easily choose ones that are safer for people and the environment. When consumers see the Safer Choice label on a product, they can be confident that the ingredients have been through a rigorous EPA review. The label means that EPA scientists have evaluated every ingredient in the product to ensure it meets Safer Choice's stringent criteria. When people use Safer Choice products, they are protecting their families and the environment by making safer chemical choices.

EPA Safer Chemical

>> Chemical: Acetic acid

>> Green circle - The chemical has been verified to be of low concern based on experimental and modeled data.

Health Hazards:

>> Breathing of vapors causes coughing, chest pain, and irritation of nose and throat; may cause nausea andvomiting. Contact with skin and eye causes burns. (USCG, 1999)

ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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: Irritating vapor generated when heated. (USCG, 1999)

ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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. Above 39 °C explosive vapour/air mixtures may be formed. Risk of fire and explosion on contact with strong oxidants.

3. Composition/Information On Ingredients

Chemical name : Acetic Acid
CAS Number : 64-19-7
Molecular Formula : C2H4O2
Molecular Weight : 60.0500 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. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. 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)

ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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 ingestedor 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 continuouscompressions. 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 immediately for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse and then wash skin with water and soap. Rinse skin with plenty of water or shower for at least 15 minutes. Refer immediately for medical attention.

Eye First Aid

>> Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

Ingestion First Aid

>> Rinse mouth. Do NOT induce vomiting. If within a few minutes after ingestion, one small glass of water may be given to drink. Refer immediately for medical attention.

5. Fire Fighting Measures

>> Advice for firefighters: wear self contained breathing apparatus for fire fighting. ...

>> Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

>> 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)

>> Excerpt from ERG Guide 153 [Substances - Toxic and/or Corrosive (Combustible)]:

>> SMALL FIRE: Dry chemical, CO2 or water spray.

>> LARGE FIRE: Dry chemical, CO2, alcohol-resistant foam or water spray. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Do not get water inside containers. 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. (ERG, 2024)

>> Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]:

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>> SMALL FIRE: Dry chemical, CO2, water spray or alcohol-resistant foam.

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>> Use powder, alcohol-resistant foam, water spray, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water.

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]:

>> 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: ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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.

>> Remove all ignition sources. Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Cautiously neutralize spilled liquid with sodium carbonate only under the responsibility of an expert.

Accidental Release Measures

Public Safety: ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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: ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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 food and feedstuffs, strong oxidants, strong acids and strong bases. Store only in original container. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.

Storage Conditions:

>> Store in a dry, well-ventilated place. Separate from oxidizing materials and alkaline substances.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

>> 10 ppm (25 mg/m³)

REL-STEL (Short Term Exposure Limit)

>> 15 ppm (37 mg/m³)

>> TWA 10 ppm (25 mg/m3) ST 15 ppm (37 mg/m3)

>> 10.0 [ppm]

PEL-TWA (8-Hour Time Weighted Average)

>> 10 ppm (25 mg/m³)

>> 10.0 [ppm]

TLV-STEL

>> 15.0 [ppm]

>> 10 ppm as TWA; 15 ppm as STEL

TLV-TWA (Time Weighted Average)

>> 10 ppm [2003]

TLV-STEL (Short Term Exposure Limit)

>> 15 ppm [2003]

EU-OEL

>> 25 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> 25 mg/m

Emergency Response: ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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: 5 ppm - one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]

>> ERPG-2: 35 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 20 °C.

Effects of Short Term Exposure:

>> The substance is corrosive to the eyes, skin and respiratory tract. Corrosive on ingestion. Inhalation may cause lung oedema, but only after initial corrosive effects on eyes and/or airways have become manifest.

Effects of Long Term Exposure:

>> Repeated or prolonged contact with skin may cause dermatitis. Lungs may be affected by repeated or prolongated exposure to an aerosol of this substance. Risk of tooth erosion upon repeated or prolongated exposure to an aerosol of this substance.

Fire Prevention

>> NO open flames, NO sparks and NO smoking. Above 39 °C use a closed system, ventilation and explosion-proof electrical equipment.

Exposure Prevention

>> AVOID ALL CONTACT!

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

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

Ingestion Prevention

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

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 132 (Acetic acid, glacial)

>> 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.

RD50 (Exposure concentration producing a 50% respiratory rate decrease)

>> 163.0 [mmHg]

Maximum Allowable Concentration (MAK)

>> 10.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 60.05

Exact Mass:

>> 60.021129366

Physical Description:

>> Acetic acid, glacial appears as a clear colorless liquid with a strong odor of vinegar. Flash point 104 °F. Density 8.8 lb / gal. Corrosive to metals and tissue. Used to make other chemicals, as a food additive, and in petroleum production.

>> COLOURLESS LIQUID WITH PUNGENT ODOUR.

Color/Form:

>> Clear, colorless liquid

Odor:

>> Pungent

Taste:

The sensation of flavor perceived in the mouth and throat on contact with a substance.

>> Burning taste

Boiling Point:

>> 244 °F at 760 mmHg (NTP, 1992)

>> 118 °C

Melting Point:

>> 61.9 °F (NTP, 1992)

>> 16.7 °C

Flash Point:

>> 104 °F (NTP, 1992)

>> 39 °C c.c.

Solubility:

>> greater than or equal to 100 mg/mL at 73 °F (NTP, 1992)

>> Solubility in water: miscible

Density:

>> 1.051 at 68 °F (USCG, 1999) - Denser than water; will sink

>> Relative density (water = 1): 1.05

Vapor Density:

>> 2.07 (NTP, 1992) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 2.1

Vapor Pressure:

>> 11.4 mmHg at 68 °F ; 20 mmHg at 86 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 1.5

LogP:

>> -0.17

LogS:

The base-10 logarithm of the aqueous solubility of this compound.

Stability/Shelf Life:

>> Stable under normal laboratory storage conditions.

Autoignition Temperature:

>> 961 °F (USCG, 1999)

>> 485 °C

Decomposition:

>> When heated to decomposition it emits irritating fumes.

Viscosity:

>> 1.056 mPa-s at 25 °C

Corrosivity:

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

>> Corrosive organic acid

Heat of Combustion:

>> 874.2 kJ/mol

Heat of Vaporization:

>> 23.36 at 25 °C; 23.70 kJ/mol at 117.9 °C;

pH:

pH is an expression of hydrogen ion concentration in water. Specifically, pH is the negative logarithm of hydrogen ion (H+) concentration (mol/L) in an aqueous solution. The term is used to indicate basicity or acidity of a solution on a scale of 0 to 14, with pH 7 being neutral.

>> Aqueous solution 1.0 molar = 2.4; 0.1 molar = 2.9; 0.01 molar = 3.4

Surface Tension:

>> 27.10 mN/m at 25 °C

Ionization Potential:

>> 10.66 eV

Polymerization:

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

>> A drum contaminated with acetic acid was filled with acetaldehyde. The ensuing exothermic polymerization reaction caused a mild eruption lasting for several hours.

Odor Threshold:

>> Odor Threshold Low: 0.03 [mmHg]

>> Odor Threshold High: 0.15 [mmHg]

>> Detection odor threshold from AIHA (mean = 0.074 ppm)

Refractive Index:

>> Index of refraction: 1.3720 @ °C/D

Dissociation Constants:

Acidic pKa

>> 4.756

pKa

>> 4.76 (at 25 °C)

>> pKa = 4.76 at 25 °C

Relative Evaporation Rate:

The rate at which a material will vaporize (evaporate, change from liquid to vapor), compared to the rate of vaporization of a specific known material.

>> Evaporation rate ... at 25 °C and a wind speed of 4.5 m/sec (16.1 kg/hr) is 0.24 g/sq m/sec ... evaporation rates of 0.077 g/sq m/sec at 0 °C and 0.42 g/sq m/sec at 30 °C ... for wind speed of 4.5 m/sec.

10. Stability And Reactivity

>> Flammable. Water soluble. Dissolution generates some heat.

CSL No

>> CSL00067

Reactants/Reagents

>> Acetic anhydride + ACETIC ACID + NITRIC ACID

Warning Message

>> Potentially explosive

GHS Category

>> Explosive

Reference Source

>> User-Reported

Modified Date

>> 7/8/18

Create Date

>> 6/27/17

Additional Information

>> Response by Neal Langerman" "Nitroso compounds are well documented as energetic and frequently spontaneously decompose ("Bretherick's Handbook of Reactive Chemical Hazards," P. G. Urben, editor, 7th Ed., Academic Press, 2007, and "Explosives," Rudolf Meyer, Josef Köhler, Axel Homburg, 6th Ed., Wiley-VCH, 2007). The compound being synthesized by Katritzky is very similar to the known explosive compound 2,4,6-trinitrobenzene-1,3-diol and the unstable compound 2,4,6-trinitrobenzene-1,3,5-triol (see Bretherick's). The metal salts of the latter are explosive. Given this literature information, it is reasonable to expect the trinitroso compound to be unstable and explosive. Under these circumstances, synthetic chemistry should be conducted with appropriate controls to prevent an explosion and to limit the size of an energetic event, should one occur." (reprint of full text). Literature citation: Langerman, Neal. esponse to an unexpected explosion. Chem. Eng. News 2008, 86 (40), 5. DOI: 10.1021/cen-v086n040.p004. (Letters: chemical safety)

DOI Link

>> 10.1021/cen-v086n040.p004

Reaction Scale

>> Large (>100g)

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Acetic acid is a colorless liquid or solid, having a pungent characteristic odor, and when diluted in water an acidic taste. Glacial acetic acid is a 99% active chemical. It is used as an acidifier, flavoring agent, for the prevention of rope in baking, and as a solvent. Acetic acid is used as a laboratory reagent in chemical and biochemical analysis, in field testing of lead fumes, vinyl chloride determination, uric acid in urine, aniline vapors, and separation of gases. In addition, acetic acid is used in pesticide formulations as a herbicide to controls weeds on fruits, vegetables, ornamentals and turf. It is also a component of the hydraulic fracturing fluids preventing precipitation of metal oxides (iron control). Registered for use in the U.S., but approved pesticide uses may change periodically, so federal, state and local authorities must be consulted for currently approved uses. Three to 5% acetic acid is commonly used in the field of gynecology for colposcopic examinations of the cervix. It gives an 'acetowhite' effect that may assist clinicians in identifying neoplastic areas. HUMAN EXPOSURE AND TOXICITY: Acetic acid is absorbed from the gastrointestinal tract and through the lungs and almost completely oxidized by tissues. The metabolic pathways are reasonably well known and involve the formation of ketone bodies. As little as 1.0 mL of glacial acetic acid has resulted in perforation of the esophagus. During acetic acid dialysis, patients showed a frequent onset of sudden hypotension and arrhythmia with concomitant symptoms of the so-called disequilibrium syndrome. Extreme eye and nasal irritation has occurred at concentrations in excess of 25 ppm and conjunctivitis from concentrations below 10 ppm has been reported. Glacial acetic acid has caused permanent corneal opacification. Ingestion of 200 mL of an 80% solution of acetic acid caused repeated shock due to myocardial infarction and massive intestinal bleeding led to an organic brain psychosyndrome. The patient survived the intoxication by use of hemodialysis and intensive care therapy. An excess of prostate cancer was observed among former chemical plant workers, some of whom had been exposed to both acetic acid and acetic anhydride. ANIMAL STUDIES: Toxic effects of acetic acid are due to irritant properties as well as its effect on the central nervous system and kidneys. Large oral doses cause CNS depression and death in rats and mice. Inhalation of 16,000 ppm killed 1 of 6 exposed rats. Groups of 3-6 rats were given acetic acid in drinking water for periods from 9-15 weeks. Fluid uptake was the same in all treatment groups, at the high dose group there was a progressive reduction in body weight gain, loss of appetite and fall in food consumption. Four groups of two young pigs were fed daily diets for successive 30 day periods for a total of 150 days. There were differences in growth rate, weight gain, early morning urinary ammonia and terminal blood pH between controls and test groups. Acetic acid had no effects on implantation or on maternal or fetal survival in rats, mice or rabbits dosed via gavage during gestation days 6-19 at doses up to 1600 mg/kg/day. The number of abnormalities seen in either soft or skeletal tissues of the test groups did not differ from the number occurring in the controls. Acetic acid has shown no evidence of mutagenic activity with or without metabolic activation using several strains of Salmonella typhimurium. Acetic acid did not show clastogenicity on cultured Chinese hamster ovary K1 cells at neutral pH, but it was clastogenic at pH 5.2 to 6.0 with or without metabolic activation. ECOTOXICITY STUDIES: Acetic acid was harmful to aquatic life. High concentrations produced pH levels toxic to oxidizing bacteria, inhibiting oxygen demand. It was lethal to Mosquito fish: at 320 ppm and higher all fish were dead at 24 hours.

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).

>> Organic lead compounds are not classifiable as to their carcinogenicity to humans (Group 3). To the extent that organic lead compounds are metabolized in part to ionic lead, they are expected to exert the toxicities associated with inorganic lead (Group 2A, probably carcinogenic to humans). (L135)

Health Effects:

>> Lead is a neurotoxin and has been known to cause brain damage and reduced cognitive capacity, especially in children. Lead exposure can result in nephropathy, as well as blood disorders such as high blood pressure and anemia. Lead also exhibits reproductive toxicity and can results in miscarriages and reduced sperm production. (L21)

Exposure Routes:

>> Serious local effects by all routes of exposure.

>> inhalation, skin and/or eye contact

Inhalation Exposure

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

Skin Exposure

>> Pain. Redness. Skin burns. Blisters.

Eye Exposure

>> Redness. Pain. Severe burns. Loss of vision.

Ingestion Exposure

>> Sore throat. Burning sensation. Abdominal pain. Vomiting. Shock or collapse.

>> irritation eyes, skin, nose, throat; eye, skin burns; skin sensitization; dental erosion; black skin, hyperkeratosis; conjunctivitis, lacrimation (discharge of tears); pharyngeal edema, chronic bronchitis

Target Organs:

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

>> Eyes, skin, respiratory system, teeth

Adverse Effects:

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

>> Dermatotoxin - Skin burns.

>> Lacrimator (Lachrymator) - A substance that irritates the eyes and induces the flow of tears.

>> Asthma - Reversible bronchoconstriction (narrowing of bronchioles) initiated by the inhalation of irritating or allergenic agents.

>> Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

Toxicity Data:

>> LC50 (mice) = 5,620 ppm/1 hr

Minimum Risk Level:

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Chronic Inhalation: 0.05 mg/m3 (L134)

Treatment:

Treatment when exposed to toxin

>> Lead poisoning is usually treated with chelation therapy using DMSA, EDTA, or dimercaprol. (L21)

Interactions:

>> Pain increases the rate, frequency, or intensity of some behaviors (eg, withdrawal responses) and suppresses other behaviors (eg, feeding). /The study is/ developing assays to test analgesic drug candidates using measurements of pain-suppressed rather than pain-elicited behaviors. Such assays may model important aspects of clinical pain and provide a means for distinguishing true analgesics from drugs that produce motor impairment. The present study compared effects of the mu opioid analgesic morphine and the nonanalgesic neuroleptic haloperidol on intraperitoneal acetic acid-induced writhing (a pain-elicited behavior) and suppression of feeding behavior (a pain-suppressed behavior). In feeding studies, C57BL/6J mice were given access to a dish containing 8 mL Ensure (trade mark) liquid

food (0-100% in water) during daily sessions (7.5-120 min). Levels of consumption were dependent on both Ensure concentration and session duration. Intraperitoneal injection of acetic acid (0.10-0.56%) produced a time- and concentration-dependent decrease in Ensure consumption. Morphine (1 mg/kg) prevented both acid-induced writhing and acid-induced suppression of feeding, whereas the dopamine antagonist haloperidol inhibited writhing without preventing acid-induced suppression of feeding. The effects of morphine were time-dependent, selective for acid-suppressed feeding, and naltrexone-reversible. These results suggest that assays of pain-suppressed behaviors may complement assays of pain-elicited behaviors in preclinical studies of candidate analgesics...

Antidote and Emergency Treatment:

>> Garlic contains many sulfhydryl compounds that act as antioxidants. However, the role of nitric oxide (NO) in inflammation is controversial. The aim of the present study is to investigate the possible protective effect of garlic against acetic acid-induced ulcerative colitis in rats, as well as the probable modulatory effect of L-arginine (NO precursor) on garlic activity. Intra-rectal inoculation of rats with 4% acetic acid for 3 consecutive days caused a significant increase in the colon weight and marked decrease in the colon length. In addition, acetic acid induced a significant increase in serum levels of nitrate as well as colonic tissue content of malondialdehyde (MDA). Moreover, colonic tissue contents of glutathione (GSH), superoxide dismutase (SOD) and catalase (CAT) were markedly reduced. On the other hand, pre-treatment of rats with garlic (0.25 g/kgbwt, orally) for 4 consecutive weeks and 3 days during induction of colitis significantly reduced the increase in the colon weight induced by acetic acid and ameliorated alterations in oxidant and antioxidant parameters. Interestingly, oral co-administration of garlic (0.25 g/kgbwt) and L-arginine (625 mg/kgbwt) for the same period of garlic administration mitigated the changes in both colon weight and length induced by acetic acid and increased garlic effect on colon tissue contents of MDA and GSH. In conclusion, L-arginine can augment the protective effect of garlic against ulcerative colitis; an effect that might be mainly attributed to its NO donating property resulting in enhancement of garlic antioxidant effect...

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Six patients with frequent episodes of symptomatic hypotension during acetate dialysis were treated with bicarbonate dialysis. ... During acetate dialysis, the patients showed a frequent onset of sudden hypotension and arrhythmia with concomitant symptoms of the so-called disequilibrium syndrome. None of these symptoms were seen during bicarbonate dialysis. /Acetate/

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ ...No effect /was found/ in guinea pigs or rabbits after /application/ of 10% acetic acid solution to intact or abraded skin patches. Concentrations from 80% to glacial produced severe burns to guinea pig skin, concentrations form 50-80% produced moderate to severe burns, and below 50% there was relatively mild injury.

Non-Human Toxicity Values:

>> LD50 Rat oral 3.53 g/kg

12. Ecological Information

ICSC Environmental Data:

>> The substance is harmful to aquatic organisms.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SEDIMENT: Acetic acid concentrations of 17.3-48.5 mmol/kg wet mud were detected in bottom sediments of Lake Biwa in Japan; however, no acetic acid was found in the interstitial water(1). Concentrations of 0.133-1.836 mg/g (dry wt) were detected in sediments from Loch Eil in Scotland. Water removed from sediments contained levels of 0.244-0.251 mg/mL(2).

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> Acetic acid occurs as a volatile emission product during fish processing(1). The volatile components of different meats of a commonly consumed crab in Asia (Charybdis feriatus) were investigated. It was determined that acetic acid concentrations (ug/kg dry weight) in the following crab meats were 74.4 (legs and claws), 85.9 (body), and 50.1 (carapace)(2).

Animal Concentrations:

Concentrations of this compound in animals.

>> Acetic acid was identified as a component of poultry manure (at concentrations from 9.17 to 464 mg/kg)(1) and was responsible for a vinegar-like odor(2).

13. Disposal Considerations

Spillage Disposal

>> Remove all ignition sources. Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking liquid in sealable containers. Cautiously neutralize spilled liquid with sodium carbonate only under the responsibility of an expert.

Disposal Methods

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

>> 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 a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Contaminated packaging: dispose of as unused product.

14. Transport Information

DOT

Acetic Acid
8
UN Pack Group: II
Reportable Quantity of 5000 lb or 2270 kg

IATA

Acetic Acid
8, 3
UN Pack Group: II

15. Regulatory Information

Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

>> Acetic acid is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges

of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Acetic acid

REACH Registered Substance

>> Status: Active Update: 24-04-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/15549

New Zealand EPA Inventory of Chemical Status

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

New Zealand EPA Inventory of Chemical Status

>> Vinegar: 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.

16. Other Information

Toxic Combustion Products:

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

>> Toxic gases and vapors (such as carbon monoxide) may be released in a fire involving acetic acid.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Acetic acid: Environment tier I assessment

>> IMAP assessments - Acetic 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. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."