





# Material Safety Data Sheet

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## Section 3 - Composition/Information On Ingredients

Pure Substance :

Chemical name : Acetic acid
Synonyms : Glacial acetic acid 、 Ethanoic acid 、 Ethylic acid 、 Methanecarboxylic acid
CAS No. : 64-19-7
Ingredient contributing to the hazard(%) : 100%

## Section 4 - First Aid Measures

<p>The First-aid Information :</p> <ul style="list-style-type: none"><li>■ Inhalation : Move ventilated area with fresh air, help restore breathing and get medical attention immediately (Hospital).</li><li>■ Skin Contact : Wash with clean water, remove contaminated clothing and seek medical attention immediately (Hospital).</li><li>■ Eye Contact : Flush with clean water for at least 15mins (include eye lids) and seek medical attention immediately (Hospital).</li><li>■ Ingestion : Use clean water to wash away liquid residue in the mouth and use milk to dilute the acid in the mouth. DO NOT induce vomiting. If the patient lost conscious, do not put anything in the mouth.</li></ul>
<p>The Most Important Symptoms and Hazardous Effects : Inhalation of more than 50ppm concentration of vapor/steam will cause eye, nose, throat, and lungs and other organs irritation. Repeated expose to high concentration than the environment will cause throat to have sense of fullness. Contact with high concentration of the Acetic acid vapor/steam will cause skin to burn and blacken, it will also cause conjunctivitis to the eye or burn to the eye that lead to permanent damage.</p>
<p>Protection of First-aiders : Staff without full body chemical-protective suit and mask should not enter the disaster are to carry the injured person. Wear class C equipment to do first aid in a safety zone.</p>
<p>Notes to a Physician :</p> <ol style="list-style-type: none"><li>1. Should consider giving oxygen to person who inhale the substance. .</li><li>2. Avoid gastric lavage or induce vomit</li></ol>

## Section 5 - Fire Fighting Measures

<p>Extinguishing Media : Spray with water, chemical foam, carbon dioxide, or dry powder fire extinguishers</p>
<p>Specific Hazards when Fire-fight :</p> <ol style="list-style-type: none"><li>1. Flammable liquid with air will form an explosive mixture.</li><li>2. Gas is heavier than air, will spread in distance, if meet with fire source may cause return fire.</li><li>3. Accumulated of the vapor in a close area will cause toxicity.</li><li>4. Decomposition during heat will produce carbon monoxide, carbon dioxide</li></ol>
<p>Specific Fire-fighting Procedure :</p> <ol style="list-style-type: none"><li>1. Retreat to a protected and safe distance before putting out the fire.</li><li>2. Stay in upwind area to avoid the dangerous vapor and poisonous decomposed material.</li></ol>



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3. Stop the leak before putting out the fire, If cannot stop the leak and the surround environment is safe, let the fire off. If the leak did not stopped, vapor will mix with air and formed explosive mixture and ignite again.
4. Segregate the staff not on fire and protect the people.
5. In safety condition, remove the fire from the scene of the fire.
6. Spray water to the container or tank that is exposed to the scene of fire.
7. If the leak did not catch fire, spray water to scatter the vapor and protect the person trying to stop the leak.
8. Do not use water stream to put out fire, it will cause the substance to scatter.
9. Large fire within a large area, use unmanned operating spray controller or self swinging fire water monitor.
10. Move away from the fire scene as soon as possible and let the fire burn out.
11. Stay away from the tanks.
12. Evacuate immediately if the alarm of the Safety valve starts or changes colors due to fire.

Specific Protection of Firefighters : Fire fighting personnel should bring mask/breathing equipment to avoid suffocation and corrosive steam/vapor cause by the burn.

## Section 6 - Accidental Release Measures

Personal Precautions : Cleaning staffs should stay in upwind area and wear protective equipments to avoid inhalation or contact of the substance.

Environmental Precautions :

1. First remove all the source of fire , collect all the leaked materials to a combustible waste barrels.
2. Contact safety personnel to deal with.
3. Maintain the best conditions of ventilation ◦
4. If small amount of leak, use large amount of water to dilute and use lime caustic soda to neutralize.

Methods for Cleaning up :

1. Do not touch the leak substance.
2. Prevent the leaked substance from entering the sewer, drainage and confined area.
3. In safety condition, try to prevent or reduce the leakage.
4. Use sand, soil or other agent that is non-reactive to the material to contain the leakage.
5. Small spill : Absorb with sand and soil or other agent that is non-reactive to the material. Agent used to absorb the material also become harmful; place them in proper covered disposal containers with labels. Other small spill can flushed with large amount of water.
6. Large Spill : Contact fire department, emergency unit and supplier for help.

## Section 7 - Handling and Storage

Handling :

1. This is a combustible and poisonous liquid. While processing, the engineering control should be operated and make good use of personal protective equipments. Staffs should under the training in hazardous info and safety use of the related substance.
2. Remove all the sources of ignition and away from the heat also other incompatible substance.
3. Work area should have "Smoking prohibited" signs.
4. Report immediately if there is leak or adverse ventilation
5. Pre-operation check if there is a leak in the container.



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6. Use manufacturer recommended tanks and containers.
7. All the tanks, containers and pipelines should be grounded, and should contact naked metal.
8. Consider use of anti-corrosion equipments, lighting, and ventilation system.
9. Emptied tanks, container and pipelines may still have hazardous residue, do not proceed to welding, cutting, drilling or other process that will produce heat if unclean.
10. When mixed with water add the corrosive liquid to the water, not water add to the corrosive liquid. Continuous add cold water while stirring to prevent produce of excessive heat.
11. Operation should avoid vapor and droplet, operate in well ventilated designated area and use the possible minimal amount. Operation area should be separated with storage area.
12. Wear personal protective gears to prevent contact with the substance or equipments contaminated with the substance.
13. Do not use with incompatible substance such as oxidizer · alkali · Caustic soda and most metals.
14. Don't return the contaminated liquid back to the container.
15. Labeled the container. Secure and cover the container when not in use to prevent damage

**Storage :**

1. Stored in cool, dried and well ventilated area. Avoid direct contact with the sun light and other heat source
2. Storage equipment should be made of anti-corrosive and fire resistant materials.
3. Storage area should be clearly marked, with no obstruction, and allowed designated or trained personnel to enter.
4. Separate work area from work area; stay away from the lift, building, room exit or main tunnels.
5. Vicinity are should have appropriate fire extinguishing and cleaning equipments.
6. Schedule regular inspection for container's leak or damage.
7. Inspect all new containers if they are properly labeled and no damage.
8. Limited storage.
9. Store in appropriate and labeled container, avoid pilling and damage of containers, maintain closed.
10. Container may still have hazardous residue, properly close the container and separate from the storage barrels.
11. Store chemicals in accordance of the manufacturer and supplier's recommended temperature.
12. The storing basin shall be based on the ground with its base completely sealed from leakage, and shall be surrounded by a fluid-protective dike capable of carrying the entire volume of storage.

**Section 8 - Exposure Controls & Personal Protection**

**Engineering measures :**

1. Use the necessary local exhausted equipment and confine manufacturing process to control the droplet and the quantity of the vapor in the air.
2. Separate anti-corrosive ventilation system.
3. Direct outdoor exhaust.
4. Provide the adequate fresh air to supply amount the air exhausted.

**Control parameters**

TWA	STEL	Ceiling	Biological standards
10 ppm	15 ppm	--	--

- Personal protective equipment : Choose the right protective equipment in accordance with the working environment and the concentration of the hazardous substances.
- Respiratory protection:



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<ol style="list-style-type: none"><li>Below 50ppm: Wear continuous-flow mode respirator with oxygen contained breathing apparatus, a full-face organic vapor respirator or chemical cartridge respirator. Wear a NIOSH approved full-face piece self-contained breathing apparatus.</li><li>Unknown concentration: Portable pressured gas mask, Portable pressured gas mask with air provider.</li><li>Escape: mask with organic filter can, portable protective breathing gear.</li></ol> <ul style="list-style-type: none"><li>■ Hand Protection : Impermeable rubber gloves made of Teflon 、 Viton 、 Saranex 、 Responder 、 4H 、 Tychem 10000.</li><li>■ Eye Protection : Wear protective goggles</li><li>■ Skin and Body Protection : Full body protective suite and boots.</li></ul>
Hygiene measures : <ol style="list-style-type: none"><li>Take off contaminated work cloths as soon as the work is done, wash before wearing or disposal, and should inform the laundry staff about the hazardous agent.</li><li>Prohibit smoking, eating and drinking in the work area.</li><li>After dealing with the substance , should wash hand completely.</li><li>Maintain cleanliness in the work area.</li></ol>

## Section 9 - Physical & Chemical Properties

Appearance : colorless 、 solid in below 16°C pure acetic acid 、 colorless and deliquescence liquid in 16°C above	Odor : strong vinegar, smell that stimulate tears Olfactory threshold : 0.037-0.15 ppm ( detecting )
Color : Transparent	Melting Point: 16.6°C
pH value : 2.4 (1M/1L water)	Boiling point/boiling range : 117.9 °C
Flammability: --	Flash point : 44.5 °C
Decomposition temp : --	Test method : Closed cup
Auto ignition temp : 516 °C (ice crystal)	Explosion properties : 4 %~ 19.9 % (ice crystal)
Vapor pressure : 15.7mmHg@25 °C	Vapor density : 2.07 ( air=1 )
Density : 1.5 ( water=1 )	Solubility : 1.05
log Kow : -0.17	Evaporation Rate : 0.97 ( Butyl acetate = 1 )

## Section 10 - Stability & Reactivity Data

Stability : Stable
Possible hazardous reactions under specific conditions : <ol style="list-style-type: none"><li>Strong oxidant (such as chromic acid, hydrogen peroxide, nitric acid, acid-off, had manganese potassium, Sodium peroxide) together will react violently, increase risk fire and explosion.</li><li>Alkali or caustic alkali (such as Sodium peroxide or potassium hydroxid) or alkali may cause violent reactions.</li><li>most metals (except aluminum) may produce gas that is flammable.</li><li>acetaldehyde - Polymerization and release heat.</li><li>2-amino ethanol, ethylene diamine, sub-B imide - mixed in a confined container will cause</li></ol>



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- increase of temperature and pressure.
6. Aluminum nitrate - might ignite by heating °
  7. Pentafluoride bromine, Chlorine trifluoride - may cause violent reaction lead to ignition of flame and explosion.
  8. Cyanate abnormal phosphorus - violent reaction.
  9. Phosphorus trichloride - produce phosphorus that may spontaneous combust, possible explosion.
  10. Butyl-third of potassium - 3 minutes after mixture will cause ignition of flame.
  11. Xylene - may produce explosive mixtures.
  12. Most metals (not include stainless steel, aluminum, nickel and alloy) strong corrosive.  
Corrosive depends on the concentration, temperature and purity.

Conditions to avoid : Temperature exceed 39°C, open flame, static, spark and ignition source.

Materials to avoid : Strong oxidizer, strong base, most of the metal, acetaldehyde, 2 - amino ethanol, acid chloride, fluoride five bromine, chlorine trifluoride, isocyanate phosphorus, phosphorus trichloride, the third-butyl potassium, the top three Benzene.

Hazardous decomposition products : --

## Section 11 - Toxicological Information

Route of exposure : Inhalation, skin contact, ingestion, eyes

Symptoms : Speed up breathing, rapid heartbeat, headaches, sweating, panting, dizziness, frostbite

Immediate Toxicity :

1. Skin :
  - 1.1 High concentration of dissolved or pure acetic acid will cause deep burn, necrosis of tissue, permanent scar damage.
  - 1.2 Low concentration will cause mild to severe irritation.
2. Inhalation : Inhalation of high concentration of vapor will cause irritation of nose and throat and leads to short breath, cough, asthma and lung damage.
3. Eye :
  - 3.1 even diluted concentration will cause severe irritation.
  - 3.2 High concentration will cause corrosion of the eye which leads to permanent eye damage.
  - 3.3 Include blindness.
4. Ingestion :
  - 4.1 Ingest 80~100% Acetic acid 100~200ml , will not cause corrosive damage to the esophagus and stomach.
  - 4.2 Even small amount inhaled will cause fatal lung edema, which leads to severe lung damage, breathing, heart failure and death.
  - LD<sub>50</sub>: 3530 mg/kg(rat , oral) ; 1060mg/kg ( rabbit, skin )
  - LC<sub>50</sub>:
    1. 16000 ppm/4H(mouse, inhalation)
    2. 525mg/open experiment(rabbit, skin) : cause severe irritation
    3. 50mg/24H(rabbit, skin) : cause mild irritation
  - LC<sub>50</sub>: 16000mg/4H(mouse, inhalation)

Specific effects :

1. Inhalation : Vapor will cause chronic irritation to the nose, throat and respiratory track.



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| <ol style="list-style-type: none"><li>2. Skin : Frequent expose will cause irritation, thicken and darken of skin.</li><li>3. Eyes : Vapor will cause chronic irritation to the eyes (conjunctivitis).</li><li>4. Teeth : Vapor will cause incisor and canine's enamel to corrode. Acid will not accumulate in the body and increase metabolism. With normal element invivo, will metabolize quickly.</li></ol> |
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## Section 12 - Ecological Information

Ecotoxicology : <ul style="list-style-type: none"><li>■ LC<sub>50</sub>(fish) : 75-88mg/l/96H</li><li>■ EC<sub>50</sub>(Aquatic Invertebrates) : 32mg/l/48H (Cyclops)</li><li>■ Bioconcentration factor (BCF) : &lt; 1</li></ul>
Persistence and degradability : <ol style="list-style-type: none"><li>1. Acetate exists in whole natural world such as plant's animal's general metabolites.</li><li>2. Acetic acid release to the atmosphere may break down to hydrogen and oxygen through photochemical reaction.<ul style="list-style-type: none"><li>■ Half-Life (Air) : --</li><li>■ Half-Life (Water surface) : --</li><li>■ Half-Life (Groundwater) : --</li><li>■ Half-Life (Soil) : --</li></ul></li></ol>
Bioaccumulative potential : Acetic acid in the water and soil can quickly proceed the decomposition of the organism.
Mobility in soil : Acetic Acid can evaporate to atmosphere through dried soil surface.
Other adverse effects : --

## Section 13 - Disposal Considerations

Methods of disposal : <ol style="list-style-type: none"><li>1. Refer to the related law and regulation.</li><li>2. Apply the specific Incinerate or hygienic bury method.</li></ol>
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## Section 14 - MSDS Transport Information

UN classification number : 2789
Proper D.O.T Shipping Name : Glacial acetic acid, Acetic acid liquid , the acid contain is greater than 80% regarding to the weight
Hazard Class : Category 8 Corrosive material , Secondary hazard category 3 flammable liquid
Packing Group : II
Marine pollution : no
Specific precautionary transport measures and conditions : --

## Section 15 - Regulatory Information

Regulations : <ol style="list-style-type: none"><li>1. Regulations for Labor Safety and Health Installations</li><li>2. Regulations for Chemical Hazard Communication</li><li>3. Organic Solvent Poisoning Prevention Regulations</li></ol>
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| <ol style="list-style-type: none"><li>4. Permissible Exposure Limits of Hazardous Substances in the Work Environment</li><li>5. Road Traffic Safety Regulations</li><li>6. Industrial Waste Storage and Disposal Regulations and Facility Standards</li><li>7. Public Hazardous Materials and Flammable Pressurized Gases Establishment Standards and Safety Control Regulations</li></ol> |
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## Section 16 - Other Information

Literature references	1. CHEMINFO Database , CCINFO Disc , 2005-1 2. RTECS Database , TOMES PLUS Disc , Vol.63 , 2005 3. ChemWatch Database , 2004-4		
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