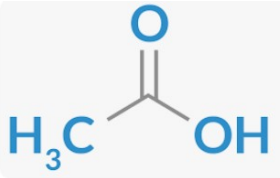
STRUCTURE AND USES OF ACETIC ACID

Structure



Acetic acid, also known as ethanoic acid, has a simple chemical structure. It consists of two carbon atoms, four hydrogen atoms, and two oxygen atoms.

Acetic acid molecules form hydrogen bonds with one another, resulting in a distinctive liquid state at room temperature.

1. Formula: CH_3COOH
2. Molar mass: 60.052 g/mol
3. IUPAC ID: Acetic acid
4. Density: 1.05 g/cm³
5. Boiling point: 117.9 °C
6. Melting point: 16.6 °C

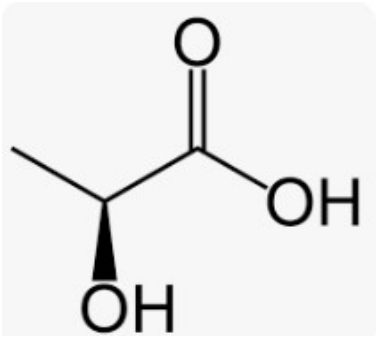
Uses Acetic Acid

1. Vinegar Production: Acetic acid is the key component in vinegar, which is commonly used as a condiment and food preservative. The fermentation of ethanol by acetic acid bacteria leads to the production of acetic acid, giving vinegar its characteristic tangy flavor.
2. Chemical Synthesis: Acetic acid serves as a crucial reagent in organic synthesis. It is used in the production of various chemicals, such as acetic anhydride, which, in turn, is utilized in the synthesis of aspirin and other pharmaceuticals.
3. Textile Industry: Acetic acid is employed in the textile industry for dyeing and finishing processes. It helps in setting dyes and improving the colorfastness of fabrics.
4. Preservation: Acetic acid is utilized as a preservative in food products like pickles and salad dressings. Its acidity inhibits the growth of spoilage microorganisms.

5. Cleaning Agent: Acetic acid is an effective natural cleaning agent. It can remove mineral deposits, stains, and odors, making it a versatile household cleaner.

LACTIC ACID

Structure:



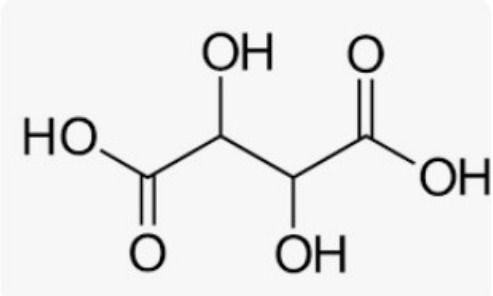
1. Lactic acid is a three-carbon organic acid with the chemical formula $C_3H_60_3$.
2. It exists in two optical isomers: L-lactic acid and D-lactic acid. Lactic acid is a chiral molecule, and its optical isomers have different properties.
3. In biological systems, L-lactic acid is the more prevalent form.

Uses:

Food and Beverage Industry: Lactic acid is widely used in the food industry as a food additive and preservative. It serves as an acidulant, pH regulator, and flavoring agent in products like yogurt, cheese, and sourdough bread.

1. Pharmaceuticals: Lactic acid is used in the pharmaceutical industry for various purposes. It can be employed as an excipient in drug formulations, as well as a component in topical creams and gels.
2. Cosmetics: Lactic acid is used in skincare products due to its mild exfoliating properties. It helps in removing dead skin cells, promoting skin renewal, and improving skin texture.
3. Biodegradable Polymers: Lactic acid is a precursor for the production of polylactic acid (PLA), a biodegradable polymer. PLA is used in packaging materials, medical devices, and 3D printing.
4. Biomedical Applications: Lactic acid is utilized in the production of biodegradable sutures and drug delivery systems. Its biocompatibility makes it suitable for medical applications.

TARTARIC ACID: STRUCTURE AND USES

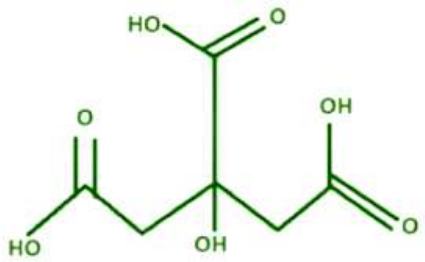


- Tartaric acid is a naturally occurring organic acid with a complex structure.
- Its chemical formula is $C_4H_6O_6$.
- Tartaric acid molecules can exist in four stereoisomeric forms, but the most common and naturally abundant form is L-(+)-tartaric acid.
- **Formula:** $C_4H_6O_6$
- **Molar mass:** 150.087 g/mol
- **Solubility in water:** 1.33 kg/L (L or D-tartaric); 0.21 kg/L (DL, racemic); 1.25 kg/L ("meso")

Uses:

1. **Food and Beverage Industry:** Tartaric acid is used as an acidulant in various food and beverage products. It is commonly added to fruit juices, soft drinks, and baking powder to control acidity and improve texture.
2. **Wine Production:** Tartaric acid naturally occurs in grapes, and it plays a critical role in winemaking. Winemakers often add tartaric acid to adjust the acidity and pH of wine. It also contributes to the formation of wine crystals, known as wine diamonds or tartrates.
3. **Medicine:** Tartaric acid is used in the pharmaceutical industry for its chelating properties. It forms stable
4. **Photography:** In traditional photography, tartaric acid was used in the development process as a component of developer solutions.
5. **Cleaning Products:** Tartaric acid is found in some cleaning products, where it helps remove mineral deposits and scale from surfaces.

CITRIC ACID STRUCTURE

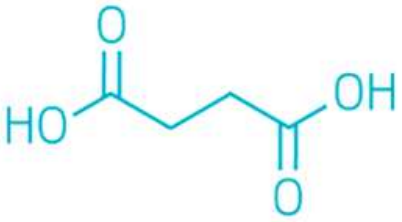


- The chemical formula of citric acid is $C_6H_80_7$.
- Monohydrate and anhydrous forms are both possible.
- Citrus fruits like lemons, oranges, and other citrus fruits contain this acid.
- A tribasic acid, it is usually found in citrus fruits. White crystalline solid, crystalline in shape, odourless, and sour in taste. There are only one type of crystal in the crystal structure. Carl Wilhelm Scheele became the first person to isolate this organic acid in 1784.
- The market refers to it as sour salt because it is similar in appearance to table salt.
- **Formula:** $C_6H_8O_7$
- **Molar mass:** 192.124 g/mol
- **Soluble in:** Water, Acetone, Dimethyl sulfoxide, Ethyl acetate

Uses

1. It has antioxidant properties
2. As an ingredient in kitchen and bathroom cleaning solutions, it can be used as a cleaning agent
3. Ice creams use it to emulsify • In soft drinks and other foods, it adds a sour taste
4. It is also used in shampoos
5. Caramel is crystallized from sucrose by using this ingredient
6. food coloring
7. It is also used in food preservation
8. Evaporators, boilers, kettles, etc. use it to clean chalky deposits.

SUCCINIC ACID STRUCTURE



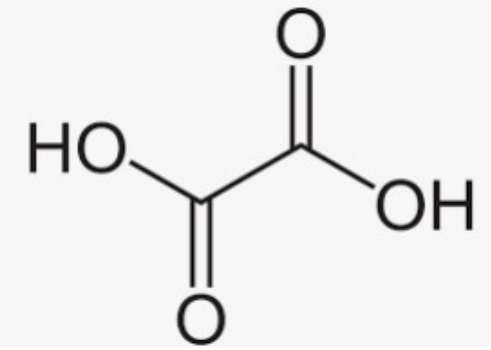
1. A dicarboxylic acid with the molecular formula C4H604,
2. Succinic acid plays a significant role in microbial metabolism, and it is widely distributed in plant and animal tissues. 185-187° C (365-369° F) melting point.
3. This is an insoluble, colourless crystalline solid soluble in water. Amber (Latin: succinum), the product of which succinic acid is named, was first used as a distillation product.
4. Catalytic hydrogenation of maleic acid or its anhydride is the most common method of creating succinic acid, but there are other methods being investigated.
5. In addition to its use as a pharmaceutical compound, succinic acid is also used in agriculture and food production.

Uses

As a chemical intermediate, this colorless, water-soluble crystal with an acid taste is used to make lacquers, medicines, and perfume esters. Sequestrants, buffers, and neutralizing agents are also formed by it in foods.

OXALIC ACID STRUCTURE

Oxalic acid has the chemical formula $C_2H_2O_4$ and is a dicarboxylic acid.



1. Plant species Oxalis and Rumex produce the potassium and calcium salts of oxalic acid in their cell sap.
2. Oxalic acid is a weak acid which partially ionizes in an aqueous solution.
3. It consists of two acidic protons. Upon ionization, $HC_2O_4^-$ is produced, a weak acid that also ionises.
4. Carbonic acid and several other acids are emitted from their salts by oxalic acid, one of the most powerful organic acids.
5. Oxalic acid is formed by either the reaction of the hydrate of potash with nitric acid or the reaction of the hydrate of potash with water.
6. Diprotic acid is also referred to as oxalic acid.

Uses

1. Dyeing processes use it as a mordant.
2. For removing rust.
3. Lanthanide chemistry relies on this reagent for important reactions
4. For shining marble sculptures
5. Dye is manufactured with it
6. To make bleach and in the removal of stains caused by food and ink during the development of photographic film.
7. As a wastewater treatment process, it removes calcium deposits.