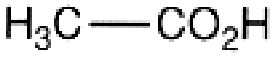
Acetic acid (Acidum aceticum)

This monograph covers three concentrations, namely glacial acetic acid, acetic acid and dilute acetic acid.



$C_2H_4O_2$, Glacial acetic acid

Relative molecular mass. Glacial acetic acid, 60.05

Chemical name. Acetic acid; CAS Reg. No. 64-19-7.

Description. Clear, colourless liquids. At a temperature below 15 °C Glacial acetic acid may occur as a translucent, crystalline mass; odour, characteristic and pungent.

Miscibility. Miscible with water, ethanol (~750 g/l) TS, and glycerol R.

Category. Acidifying agent.

Storage. Acetic acid should be kept in a tightly closed container.

Additional information. Glacial acetic acid is flammable and should be handled with care. Congealing point, about 15 °C.

Relative densities. d_{20}^{20}

- Glacial acetic acid 1.050
- Acetic acid 1.041
- Dilute acetic acid 1.005

Requirements

Glacial acetic acid contains not less than **99.0%** ***m/m*** and not more than the equivalent of **100.5%** ***m/m*** of $C_2H_4O_2$.

Acetic acid contains not less than **32.5%** ***m/m*** and not more than the equivalent of **33.5%** ***m/m*** of $C_2H_4O_2$.

Dilute acetic acid contains not less than **5.7%** ***m/m*** and not more than the equivalent of **6.3%** ***m/m*** of $C_2H_4O_2$.

Identity tests

A. Strongly acid, when diluted.

B. Transfer to a test-tube either 0.1 mL of Glacial acetic acid with 1 mL of water, or take 1 mL of Acetic acid or of Dilute acetic acid; to each add 1 mL of ethanol (~750 g/l) TS and 1 mL of sulfuric acid (~1760 g/l) TS, and heat the mixture to boiling; ethyl acetate, perceptible by its odour (proceed with caution), is produced.

C. Dilute either 0.3 mL of Glacial acetic acid with 3 mL of water or 1 mL of Acetic acid with 2 mL of water, or take 3 mL of Dilute acetic acid; neutralize each of them with ammonia (~100 g/l) TS. Then add 0.5 mL of lanthanum nitrate (30 g/l) TS, 0.1 mL of iodine TS, and 0.05 mL of ammonia (~100 g/l) TS. Heat the mixtures carefully to boiling and allow to stand; a dark blue colour appears.

Heavy metals. Take 3.5 mL of Glacial acetic acid, 10 mL of Acetic acid, or 20 mL of Dilute acetic acid. Evaporate each of the volumes to dryness on a water-bath. To each residue add 1.5 mL of hydrochloric acid (0.1 mol/l) VS, warm gently to dissolve, and determine the heavy metals content as described under 2.2.3 Limit test for heavy metals, Method A; Glacial acetic acid contains not more than 6 µg/g, Acetic acid not more than 2 µg/g, and Dilute acetic acid not more than 1 µg/g.

Chlorides. Take 3.5 mL and proceed with the test as described under 2.2.1 Limit test for chlorides; the chloride content is not more than 70 µg/g.

Sulfates. Take 2 mL and proceed as described under 2.2.2 Limit test for sulfates; the sulfate content is not more than 0.24 mg/g.

Non-volatile residue. Evaporate a volume of known mass (not less than 10 g) to dryness on a water-bath and dry at 105 °C; the residue weighs not more than 0.1 mg/g.

Readily oxidizable substances. Dilute 5 mL of Glacial acetic acid with 10 mL of water and dilute again 5 mL of this solution with 20 mL of water, or use 5 mL of Acetic acid diluted with 20 mL of water, or use 25 mL of Dilute acetic acid. To each add 0.2 mL of potassium permanganate (0.02 mol/l) VS, and allow to stand for 30 seconds; the colour is not entirely discharged.

Assay. To about 2 g, accurately weighed, of Glacial acetic acid and 50 mL of water, or about 5 g, accurately weighed, of Acetic acid and 50 mL of water, or about 20 g, accurately weighed, of Dilute acetic acid and 30 mL of water, add 3 drops of phenolphthalein/ethanol TS and titrate with carbonate-free sodium hydroxide (1 mol/l) VS. Repeat the procedure without the

acids being examined and make any necessary corrections.

Each mL of carbonate-free sodium hydroxide (1 mol/l) VS is equivalent to 60.05 mg of $C_2H_4O_2$.