LACTIC ACID

Prepared at the 46th JECFA (1996), published in FNP 52 Add 4 (1996) superseding specifications prepared at the 21st JECFA (1977), published in NMRS 57 (1977) and in FNP 52 (1992). Metals and arsenic specifications revised at the 63rd JECFA (2004). An ADI 'not limited' for lactic acid and its salts was established at the 23rd JECFA (1979)

SYNONYMS INS No. 270

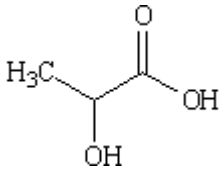
DEFINITION Obtained by the lactic fermentation of sugars or is prepared synthetically; may contain condensation products such as lactic acid, lactate and dilactide. Common products of commerce are 50-90% solutions. Solid products containing about 100-125% of titratable lactic acid also exist. (Note: Lactic acid is hygroscopic and when concentrated by boiling or by distillation it forms condensation products which hydrolyze to lactic acid on dilution and heating in water).

Chemical names: Lactic acid, 2-hydroxypropanoic acid, 2-hydroxypropionic acid

C.A.S. number: 50-21-5 (L-: 79-33-4; D-: 10326-41-7; DL-: 598-82-3)

Chemical formula: $C_3H_6O_3$

Structural formula



Formula weight: 90.08

Assay: Not less than 95.0% and not more than 105.0% of the labelled concentration. For the purity tests, prepare an aqueous solution containing 40% of lactic acid, using the labelled concentration. To dissolve the sample, use warming if necessary. When the labelled concentration is less than 40%, use the product for the test without dilution. The amount of sample to be tested in the tests is the amount of lactic acid calculated from the labelled concentration of the products, except in the tests for "sugars" and for "readily carbonizable substances". In the latter two tests, the term "sample" refers to the 40% solution of lactic acid. The limit of the tests is based on the amount of lactic acid, calculated from the labelled concentration.

DESCRIPTION Colourless, syrupy liquid or white to light yellow solid or powder

FUNCTIONAL USES Acid, acidifier

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4): Liquid: Soluble in water and in ethanol

	Solid: Sparingly soluble in water, soluble in acetone
Test for acid	A 1 in 10 solution or dispersion of the sample is acid to litmus paper
Test for lactate (Vol. 4)	Passes test
PURITY	
Sulfated ash (Vol. 4)	Not more than 0.1% Test 2 g of the sample (Method I). Retain the ash for use in the test for iron.
Chloride	Not more than 0.2% Weigh accurately a portion of the sample solution equivalent to about 5 g of lactic acid, dissolve in 50 ml of water, and neutralize to litmus with sodium hydroxide solution (1 in 4). Add 2 ml of potassium chromate TS and titrate with 0.1N silver nitrate to the first appearance of a red tinge. Each ml of 0.1N silver nitrate is equivalent to 3.545 mg of Cl.
Sulfate	Not more than 0.25% Weigh accurately a portion of the sample solution equivalent to about 50 g of lactic acid, transfer into a 600-ml beaker, dissolve in 200 ml of water, and neutralize to between pH 4.5 and 6.5 with sodium hydroxide solution (1 in 2), making the final adjustment with a more dilute alkali solution. Filter, if necessary, and heat the filtrate or clear solution to just below the boiling point. Add 10 ml of barium chloride TS, stirring vigorously, boil the mixture gently for 5 min, and allow to stand for at least 2 h, or preferably overnight. Collect the precipitate of barium sulfate in a tared Gooch crucible, wash until free from chloride, dry, and ignite at 600° to constant weight. The weight of barium sulfate so obtained, multiplied by 0.412, represents the weight of SO_4 in the sample taken.
Iron	Not more than 10 mg/kg To the ash obtained in the test for Sulfated ash add 2 ml of dilute hydrochloric acid (1 in 2), and evaporate to dryness on a steam bath. Dissolve the residue in 1 ml of hydrochloric acid, dilute to 40 ml with water, and add 40 mg of ammonium persulfate crystals and 10 ml of ammonium thiocyanate TS. Any red or pink colour does not exceed that produced by 2.0 ml of Iron Standard Solution (20 µg Fe) in an equal volume of solution containing the quantities of reagents used in the test.
Cyanide	To 0.1 g of the sample add 3 ml of a 20% of sodium hydroxide solution and heat on a water bath for 10 min. After cooling, add 1 drop of phenolphthalein TS and add dropwise dilute acetic acid TS until the pink colour has disappeared. Add 3 drops of dilute acetic acid TS and water to make 40 ml. Add 0.6 ml of chloramine-T solution (dissolve 1 g of chloramine-T ($C_7H_7NNaO_2SCl \cdot 3H_2O$) in water to make 100 ml; prepare freshly before use) and allow to stand for 3 min. Add 10 ml of pyridine-pyrazolone (dissolve 0.5 g of 1-phenyl-3-methyl-5-pyrazolone in 100 ml of hot water at 75° and cool to room temperature; mix with 20 ml of pyridine containing 0.025 g of bis-(1-phenyl-3-methyl-5-pyrazolone); prepare freshly before use) and allow to stand for 25 min. No blue colour is produced (limit approx. 1 mg/kg).

Citric, oxalic, phosphoric or tartaric acid	Dilute 1 g of the sample to 10 ml with water, add 40 ml of calcium hydroxide TS, and boil for 2 min. No turbidity is produced
Sugars	Add 5 drops of the sample solution to 10 ml of hot alkaline cupric tartrate TS. No red precipitate is formed.
Readily carbonizable substances	Superimpose carefully 5 ml of the sample solution kept at 15^{o} on 5 ml of sulfuric acid TS kept at 15^{o}. No deep grey colour is produced within 15 min at the contact zone of the two liquids.
Lead (Vol. 4)	Not more than 2 mg/kg Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, “Instrumental Methods.”
METHOD OF ASSAY	Weigh accurately a portion of the sample equivalent to about 3 g of lactic acid, transfer to a 250-ml flask, add 50 ml of 1N sodium hydroxide, mix, and boil for 20 min. Add phenolphthalein TS, titrate the excess alkali in the hot solution with 1N sulfuric acid, and perform a blank determination. Each ml of 1N sodium hydroxide is equivalent to 90.08 mg of $C_3H_6O_3$.