COEI-1-ACILAC L-Lactic acid, D-Lactic acid, D,L-Lactic acid2-hydroxypropanoic acid

N° SIN : 270

C.A.S. number 50-21-5

(L-: 79-33-4; D-: 10326-41-7; DL-: 598-82-3)

chemical formula C3H6O3

Molecular mass: 90.08, density 1.20-1.21.

1. Object, origin and field of application

An acid of natural origin obtained by lactic fermentation of sugars or synthetically made; it may contain condensation products such as lactate from lactic acid and dilactide.

It is used for the acidification of musts and wines in the conditions set by the regulation.

2. Labelling

The label must mention particularly clearly that it concerns L-lactic or D-Lactic acids obtained by fermentation or D,L-Lactic obtained by a chemical process, the storage conditions and expiration date.

The common commercial products are solutions at 50%-90%.

Solid products containing about 100%-125% of titrable lactic acid also exist. (Note: Lactic acid is hygroscopic and once concentrated by boiling or distillation, it forms condensation products that hydrolyse into lactic acid by dilution and by heating in water).

Purity level: not less than 95.0% and not more than 105.0% of the concentration marked.

3. Characteristics

Colourless or slightly yellow and syrupy liquid with a clearly acid flavour to a slightly lactic taste.

4. Solubility

- Water at 20°C: very soluble
- Alcohol at 95% vol.: Very soluble
- Ether: very soluble
- Insoluble in chloroform.

5. Optical rotation

For L-lactic acid aqueous solution at 2.5 g for 100 ml.

$\alpha^{D}_{21-22°c}$ is 2.6°

For D-lactic acid in aqueous solution at 8 g for 100 ml.

$\alpha^{D}_{21-22°c}$ is -2.6°

6. Identity characters

6.1. Characterisation of lactic acid

In a 100 ml conical flask, weigh 10 g of lactic acid, add 5 ml of sulphuric acid 0.5 M, shake, add 25 ml of potassium permanganate at 0.33% and place on a hot plate. Collect the vapour released on a filter paper soaked with a solution at 50% vol/vol of morpholine at 20% and potassium nitrocyanoferrate (II) at 5%.

The filter paper becomes blue.

6.2. Determination of total lactic acid

Titrate the free lactic acid with sodium hydroxide 1 M then hydrolyse the polymerised lactic acid using an excess of sodium hydroxide and then determined by sulphuric acid 0.5 M.

6.3. Colour

Compare the colour with the standards of the alpha scale (colour standards of platinum-cobalt).

6.4. Stereochemical purity

The method is based on the separation by HPLC using a chiral phase of two enantiomers of lactic acid. The product is diluted in water beforehand. Enzymatic determinations can also be performed according to the methods in the Compendium of international methods of analysis of wines and musts.

7. Test trials

7.1. Preparation of the test trial solution

For the purity test trials, prepare a solution containing 10% m/v of lactic acid by using the concentration marked.

7.2. Sulphuric ashes

From a 2 g sample of lactic acid, determine the sulphuric ashes as indicated in chapter II of the International Oenological Codex.

The content must be less than or equal to 1 g/kg.

7.3. Chlorides

To 0.5 ml of the test trial solution (7.1), add 14.5 ml of water, 5 ml of diluted nitric acid (R) and 0.5 ml of silver nitrate solution at 5% (R). The solution should satisfy for the test trial, the determination limit of chlorides described in chapter II of the International Oenological Codex.

The chloride content must be less than 1 g/kg expressed in hydrochloric acid.

7.4. Iron

To 10 ml of the test trial solution (7.1), add 1 ml of concentrated hydrochloric acid (R) and 2 ml of the potassium thiocyanate solution at 5% (R). The red colouration obtained must not be darker than the control prepared with 1 ml of the iron salt solution (III) at 0.010 g of iron per litre (R), 9 ml of water and the same quantities of the same reagents.

The iron content must be less than 10 mg/kg.

Iron can also be determined by atomic absorption spectrometry according to the method described in chapter II of the International Oenological Codex.

7.5. Lead

Using the test trial solution (7.1), apply the method described in chapter II of the International Oenological Codex.

Lead content should be less than 2 mg/kg.

7.6. Mercury

Using the test trial solution (7.1), determine the mercury according to the method described in chapter II of the International Oenological Codex.

Mercury content should be less than 1 mg/kg.

7.7. Cadmium

Using the test trial solution (7.1), determine the cadmium according to the method described in chapter II of the International Oenological Codex.

Cadmium content should be less than 1mg/kg.

7.8. Arsenic

Using the test trial solution (7.1), determine the arsenic according to the method described in chapter II of the International Oenological Codex.

Arsenic content should be less than 3 mg/kg.

7.9. Sulphates

To 1 ml of the test trial solution (7.1), add 18 ml of water, 1 ml of diluted hydrochloric acid at 10% (R) and 2 ml of barium chloride solution at 10% (R). The solution should satisfy for the test trial, the determination limit of sulphates described in chapter II of the International Oenological Codex.

Sulphate content should be less than 1 g/kg, expressed in sulphuric acid.

7.10. Cyanides

In a 40 ml volumetric flask containing 25 ml of distilled water and 2.5 ml of buffer solution at pH 7.5 (R), introduce 0.4 ml of the test trial solution (7.1), add 0.3 ml of chloramine T solution at 0.1% (R). Wait 90 seconds and add 6 ml of pyridine-pyrazolone reagent (R). Complete to 40 ml with distilled water and mix. The colouration obtained must not be darker than that obtained by treating the same way 4 ml of a freshly prepared potassium cyanide solution titrating 1 mg of hydrocyanic acid per litre (R).

Free cyanide content expressed in hydrocyanic acid should be less than 1 mg/kg.

7.11. Citric acid

To 5 ml of the test trial solution (7.1), add 5 ml of water, 2 ml of mercury sulphate solution (II) (R), bring to the boil and add a few drops to the potassium permanganate solution at 2% (R). No white precipitate should form.

7.12. Citric, oxalic, tartaric and phosphoric acids

Dilute 1 ml of the test trial solution (7.1) in 10 ml of water, add 40 ml of the calcium hydroxide solution (R) bring to the boil for 2 minutes. No turbidity should form.

7.13. Sugars

Add 2 ml of the test trial solution (7.1) to 10 ml of cupro-alkaline reagent (R). No red

precipitate should form.

8. Storage

Lactic acid should be stored in hermetically sealed containers away from heat and light.