

**OIV-MA-AS313-05A Tartaric acid**

## Type IV method

**1. Principle**

Tartaric acid is precipitated in the form of calcium ( $\pm$ )tartrate and determined gravimetrically. This determination may be completed using a volumetric procedure for comparison. The conditions for precipitation (pH, total volume used, concentrations of precipitating ions) are such that precipitation of  $\pm$  calcium ( $\pm$ )tartrate is complete whereas the calcium D(-) tartrate remains in solution.

When *meta*-tartaric acid has been added to the wine, which causes the precipitation of the calcium ( $\pm$ )tartrate to be incomplete, it must first be hydrolyzed.

**2. Method**2.1. *Gravimetric method*

## 2.1.1. Reagents

Calcium acetate solution containing 10 g of calcium per liter:

Calcium carbonate, $\text{CaCO}_3$	25 g
Acetic acid, glacial, $\text{CH}_3\text{COOH}$ ( $\rho_{20} = 1.05$ g/mL)	40 mL
Water to	1000 mL

Calcium ( $\pm$ )tartrate, crystallized:  $\text{CaC}_4\text{O}_6\text{H}_4 \cdot \text{H}_2\text{O}$ .

Place 20 mL of L(+) tartaric acid solution, 5 g/L, into a 400 mL beaker.

Add 20 mL of ammonium D(-) tartrate solution, 6.126 g/L, and 6 mL of calcium acetate solution containing 10 g of calcium per liter.

Allow to stand for two hours to precipitate. Collect the precipitate in a sintered glass crucible of porosity No 4, and wash it three times with about 30 mL of distilled water.

Dry to constant weight in the oven at 70°C. Using the quantities of reagent indicated above, about 340 mg of crystallized calcium ( $\pm$ ) tartrate is obtained. Store in a stoppered bottle.

- Precipitation solution (pH 4.75):

D(-) ammonium tartrate	150 mg
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## Tartaric Acid (gravimetry) (Type-IV)

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Calcium acetate solution, 10 g calcium/L 8.8 mL

Water to 1000 mL

Dissolve the D(±) ammonium tartrate in 900 mL water; add 8.8 mL calcium acetate solution and make up to 1000 mL. Since calcium (±)tartrate is slightly soluble in this solution, add 5 mg of calcium (±)tartrate per liter, stir for 12 hours and filter.

*Note:* The precipitation solution may also be prepared from D(-) tartaric acid.

D(-) tartaric acid 122 mg

Ammonium hydroxide solution ( $\rho_{20} = 0.97$  g/mL), 25 % (v/v) 0.3 mL

Dissolve the D(-) tartaric acid, add the ammonium hydroxide solution and make up to about 900 mL; add 8.8 mL of calcium acetate solution, make up to a liter and adjust the pH to 4.75 with acetic acid. Since calcium (±) tartrate is slightly soluble in this solution, add 5 mg of calcium (±)tartrate per liter, stir for 12 hours and filter.

### 2.1.2. Procedure

Wines with no added *meta*-tartaric acid

Place 500 mL of precipitation solution and 10 mL of wine into a 600 mL beaker. Mix and initiate precipitation by rubbing the sides of the vessel with the tip of a glass rod. Leave to precipitate for 12 hours (overnight).

Filter the liquid and precipitate through a weighed sintered glass crucible of porosity No. 4 fitted on a clean vacuum flask. Rinse the vessel in which precipitation took place with the filtrate to ensure that all precipitate is transferred.

Dry to constant weight in an oven at 70°C. Weigh. Let  $\mu$  be the weight of crystallized calcium (±)tartrate,  $\text{CaC}_4\text{O}_6\text{H}_4 \cdot 4\text{H}_2\text{O}$ , obtained.

Wines to which *meta*-tartaric acid has been added.

When analyzing wines to which *meta*-tartaric acid has been or is suspected of having been added, proceed by first hydrolyzing this acid as follows:

Place 10 mL of wine and 0.4 mL of glacial acetic acid,  $\text{CH}_3\text{COOH}$ , ( $\rho_{20} = 1.05$  g/mL) into a 50 mL conical flask. Place a reflux condenser on top of the flask and boil for 30 min. Allow to cool and then transfer the solution in the conical flask to a 600 mL beaker. Rinse the flask twice using 5 mL of water each time and then continue as described above.

*Meta*-Tartaric acid is calculated and included as tartaric acid in the final result.

### 2.1.3. Expression of results

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One molecule of calcium ( $\pm$ )tartrate corresponds to half a molecule of L(+) tartaric acid in the wine.

The quantity of tartaric acid per liter of wine, expressed in milliequivalents, is equal to: 384.5 *p*.

It is quoted to one decimal place.

The quantity of tartaric acid per liter of wine, expressed in grams of tartaric acid, is equal to 28.84 *p*.

It is quoted to one decimal place.

The quantity of tartaric acid per liter of wine, expressed in grams of potassium tartrate, is equal to: 36.15 *p*.

It is quoted to one decimal place.

### 2.2. Comparative volumetric analysis

#### 2.2.1. Reagents

Hydrochloric acid ( $\rho_{20} = 1.18$  to  $1.19$  g/mL) diluted 1:5 with distilled water

EDTA solution, 0.05 M:

EDTA (ethylenediaminetetraacetic acid disodium salt)	18.61 g
Water to	1000 mL

Sodium hydroxide solution, 40% (*m/v*):

Sodium hydroxide, NaOH	40 g
Water to	100 mL

Complexometric indicator: 1% (*m/m*)  
2-hydroxy-1-(2-hydroxy-4-sulpho-1-naphthylazo)

3-naphthoic acid	1 g
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#### 2.2.2. Procedure

After weighing, replace the sintered glass crucible containing the precipitate of

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calcium ( $\pm$ ) tartrate on the vacuum flask and dissolve the precipitate with 10 mL of dilute hydrochloric acid. Wash the sintered glass crucible with 50 mL of distilled water.

Add 5 mL 40% sodium hydroxide solution and about 30 mg of indicator. Titrate with EDTA solution, 0.05 M. Let the number of mL used be  $n$ .

### 2.2.3. Expression of results

The quantity of tartaric acid per liter of wine, expressed in milliequivalents, is equal to:  $5 n$ .

It is quoted to one decimal place.

The quantity of tartaric acid per liter of wine, expressed in grams of tartaric acid, is equal to:  $0.375 n$ .

It is quoted to one decimal place.

The quantity of tartaric acid per liter of wine, expressed in grams of potassium acid tartrate, is equal to:  $0.470 n$ .

It is quoted to one decimal place.

### Bibliography

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