OIV-MA-AS2-10 Folin Ciocalteu Index

Type IV method

1. Definition

The Folin-Ciocalteu index is the result obtained by applying the method described below.

2. Principle

All phenolic compounds contained in wine are oxidized by Folin-Ciocalteu reagent. This reagent is formed from a mixture of phosphotungstic acid, $H_3PW_{12}O_{40}$, and phosphomolybdic acid, $H_3PMo_{12}O_{40}$, which, after oxidation of the phenols, is reduced to a mixture of blue oxides of tungsten, W_8O_{23}, and molybdenum, Mo_8O_{23}. The blue coloration produced has a maximum absorption in the region of 750 nm, and is proportional to the total quantity of phenolic compounds originally present.

3. Apparatus

Normal laboratory apparatus, in particular:

3.1. 100 mL volumetric flasks.

3.2. Spectrophotometer capable of operating at 750 nm.

4. Reagents

1. Folin-Ciocalteu reagent

This reagent is available commercially in a form ready for use.

Alternatively it may be prepared as follows: dissolve 100 g of sodium tungstate, $Na_2WO_42H_2O$, and 25 g of sodium molybdate, $Na_2MoO_42H_2O$, in 700 mL of distilled water. Add 50 mL phosphoric acid 85% (□$_{20}$ = 1.71 g/mL), and 100 mL of concentrated hydrochloric acid (□$_{20}$ = 1.19 g/mL). Bring to the boil and reflux for 10 hours. Then add 150 g of lithium sulfate, $Li_2SO_4H_2O$, and a few drops of bromine and boil for 15 minutes. Allow to cool and make up to one liter with distilled water.

4.2. Anhydrous sodium carbonate, Na_2CO_3, made up into a 20% (*m/v*) solution.

5. Procedure

1. Red wine

Introduce the following into a 100 mL volumetric flask (3.1) strictly in the following order:

- 1 mL of the wine, previously diluted 1/5,
- 50 mL of distilled water,
- 5 mL of Folin-Ciocalteu reagent (4.1),
- 20 mL of sodium carbonate solution (4.2).

Bring to 100 mL with distilled water.

Mix to dissolve. Leave for 30 minutes for the reaction to stabilize. Determine the absorbance at 750 nm through a path length of 1 cm with respect to a blank prepared with distilled water in place of the wine.

If the absorbance is not in the region of 0.3 appropriate dilution should be made.

5.2. White wine

Carry out the same procedure with 1 mL of undiluted wine.

6. Expression of results

1. Calculation

The result is expressed in the form of an index obtained by multiplying the absorbance by 100 for red wines diluted 1/5 (or by the corresponding factor for other dilutions) and by 20 for white wines.

6.2. Precision

The difference between the results of two determinations carried out simultaneously or very quickly one after the other by the same analyst must not be greater than 1. Good precision of results is aided by using scrupulously clean apparatus (volumetric flasks and spectrophotometer cells).