COEI-2-SODIUM Determination of sodium by absorption atomic spectrometry

1. Principle

The sodium is determined after mineralisation by dry process by atomic absorption spectrometry.
The addition of a spectral buffer (cesium chloride) to avoid ionisation of sodium is necessary.

2. Apparatus

2.1. Glassware

- Graduated flasks 50 and 100 ml (class A)
- Graduated pipettes 2.0; 5.0; 10.0 ml (class A)
- Automatic pipette 1000 µl
- Cylindrical vase 100 ml.

2. Instrumental parameters: (given as an example)

- Atomic absorption spectrophotometer
- oxidant air-acetylene flame (rate-air: 3.1 l/mn; rate-acetylene: 1.8 l/mn)
- wave length: 589.0 nm
- hollow-cathode lamp (sodium)
- width of slit: 0.2 nm
- intensity of the lamp: 5 mA
- no correction of non specific absorption

3. Reagents

3.1. Pure demineralised water for analysis

3.2. Pure nitric acid for analysis at 65%

3.3. Cesium chloride solution at 5% in cesium: Dissolve 6.330 g of cesium chloride in 100 ml of pure demineralised water for analysis.

3.4. Sodium reference solution at 1 g/l commercial or prepared as follows: dissolve

3.6968 g $NaNO_3$ in water, adjust at 1 l.

3.5. Diluted sodium solution at 10 mg/l:

Place 1 ml of the reference solution at 1 g/l in a 100 ml graduated flask, 1 ml of nitric acid at 65%, complete to volume with pure demineralised water for analysis.

3.6 Set of calibration solutions 0; 0.25; 0.50; 0.75; 1.00 mg of sodium per litre:

In a series of 100 ml graduated flasks, place 0; 2.5; 5.0; 7.5; 10 ml of the diluted sodium solution; in all the graduated flasks add 2 ml of the cesium chloride solution and adjust the volume at 100 ml with pure demineralised water for analysis.

The calibration solutions prepared contain 1 g of cesium per litre; they are stored in polyethylene flasks.

4. Preparation of samples

4.1. Liquid or solution oenological products

In a 50 ml graduated flask, place 1 ml of the cesium chloride solution at 5% and a volume of sample after having been completed to volume with demineralised water, the concentration of sodium to be measured is below at 1 mg/l.

4.2. Solid oenological products

Proceed with a mineralisation by dry process (take up the cinders in 2 ml of hydrochloric acid in a 100 ml flask, add 2 ml of cesium chloride at 5% and complete to volume with demineralised water).

Perform a blank test with demineralised water.

5. Determinations

Present successively calibration solutions.

Perform an absorbance reading for 10 seconds; perform two measurements.

Set up the calibration curve (absorbance depending on the concentration in mg/l of sodium).

Then present the samples; determine the concentration of sodium of the diluted samples in mg/l.

Calculate the concentration of sodium in the oenological products in mg/kg.

The dosages of air-acetylene flame are performed manually.