OIV-MA-BS-01

Reference method for the determination of alcoholic strength by volume of spirit drinks of viti-vinicultural origin: General Remarks

Introduction

The reference method includes two Annexes:
Annex I - Preparation of distillate
Annex II - Measurement of density of distillate by three methods A, B, and C

1. Scope

The method is suitable for the determination of the real alcoholic strength by volume of spirit drinks of viti-vinicultural origin.

2. Normative References

ISO 3696:1987 Water for analytical laboratory use - Specifications and test methods.

3. Terms and Definitions

3.1 Reference temperature:
The reference temperature for the determination of alcoholic strength by volume, density and specific gravity of spirit drinks is 20 °C.

Note 1: The term 'at t °C' is reserved for all determinations (of density or alcoholic strength by volume) expressed at a temperature other than the reference temperature of 20 °C.

3.2 Density:
The density is the mass per unit volume in vacuo of spirit drinks at 20 °C. It is expressed in kilograms per cubic metre and its symbol is $\rho_{20\,°C}$

or ρ_2

3.3 Apparent alcoholic strength:
The apparent alcoholic strength of alcohols and spirituous beverages is equal to the number of litres of ethyl alcohol contained in 100 litres of an aqueous-alcoholic mixture with the same density as that of the alcohol or spirituous beverage. Therefore, the apparent alcoholic strength is directly deduced from the density of the product, without distillation. The apparent alcoholic strength is expressed in % vol.

3.4 Specific gravity:
The specific gravity is the ratio, expressed as a decimal number, of the density of spirit drinks at 20 °C to the density of water at the same temperature. It is denoted by the symbol $d_{20\,°C/20\,°C}$ or $d_{20/20}$, or simply d when there is no possibility of confusion. The characteristic that was measured must be specified on the assay certificate using the above-defined symbols only.

Note 2: It is possible to obtain the specific gravity from the density ρ_{20} at 20 °C:

$\rho_{20} = 998.203 \times d_{20/20}$ or $d_{20/20} = \rho_{20} / 998.203$ where 998.203 is the density of water at 20 °C.

3.5 Real alcoholic strength by volume:
The real alcoholic strength by volume, or alcohol by volume (ABV), of spirit drinks is equal to the number of litres of ethyl alcohol contained in 100 l of a water-alcohol mixture having the same density as the alcohol or spirit after distillation. The reference values for alcoholic strength by volume (% vol.) at 20 °C versus density at 20 °C for different water-alcohol mixtures that are to be used are those given in the international table adopted by the International Legal Metrology Organisation in its Recommendation no. 22.

Note 3: For liqueurs and crèmes for which it is very difficult to measure

volume accurately the sample must be weighed and the alcoholic strength is calculated first by mass.

Conversion formula:

$$\text{alcoholic strength by volume (\%vol)} = \frac{\text{ASM (\%mass)} \times \rho_{20}\text{(sample)}}{\rho_{20}\text{(alcohol)}}$$

where ASM = alcoholic strength by mass,
ρ_{20} (alcohol) = 789.24 kg/m^3

3.6 Density – Alcoholic Strength Correspondence

The reference values for the alcoholic strength (% vol.) at 20 °C, defined in 3.3 and 3.5, versus density at 20 °C for different aqueous-alcoholic mixtures that are to be used are those given in the international table adopted by the International Organization of Legal Metrology in its recommendation N° 22.

3.7 Obscuration:

Obscuration is defined as the difference between the real alcoholic strength by volume and the apparent alcoholic strength, expressed in % vol.

4. Principle

Following distillation the alcoholic strength by volume of the distillate is determined by pycnometry, electronic densimetry, or densimetry using a hydrostatic balance.

5. Bibliography

Commission Regulation (EC) N° 2870/2000 of 19 December 2000 laying down Community reference methods for the analysis of spirits drinks, *OJEC of 29 December 2000, L333/20*

P. Brereton, S. Hasnip, A. Bertrand, R. Wittkowski, C. Guillou, Analytical methods for the determination of spirit drinks, Trends in Analytical Chemistry, Vol. 22, No. 1, 19-25, 2003