International Standard 6286

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Molecular absorption spectrometry — Vocabulary — General — Apparatus

Spectrométrie d'absorption moléculaire — Vocabulaire — Généralités — Appareillage

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

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It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Poland
Austria	Hungary	Portugal
Belgium	India	Romania
Brazil	Italy	South Africa, Rep. of
China	Korea, Rep. of	Switzerland
Egypt, Arab Rep. of	Mexico	USSR
France	Netherlands	

No member body expressed disapproval of the document.

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Molecular absorption spectrometry — Vocabulary — General — Apparatus

1 Scope and field of application

This International Standard gives definitions of a certain number of terms, and some general information, relating to molecular absorption spectrometry of solutions, together with general data concerning the instruments used, and, in particular, specifies :

a) the terminology to be used to characterize, by description, these instruments;

b) the characteristics and qualities of an instrument, by giving a summary of the principles of certain methods of verifying them.

2 Terms, definitions, symbols, formulae and units

Molecular absorption spectrometry is a technique applicable to both qualitative and quantitative analyses and it enables measurements to be made of the concentration of a compound dissolved in a solution; it is effective in the near ultraviolet, visible and near infra-red regions, which correspond to a wavelength interval from about 180 to 1 000 nm.

The terms given in tables 1 and 2 are classified so that they are defined before their use in later definitions.

Table 1 is given for the purposes of comprehensiveness; it collates terms from the Vocabulaire international de l'éclairage (International lighting vocabulary), account of which has been taken in the choice of terms and in the drawing up of the definitions forming the subject of table 2. In table 1

— terms 1 to 8 relate to the interaction of any electromagnetic radiation of an optical nature (UV, visible, IR) with any medium observed from the outside;

— terms 9 to 11 relate to the interaction of any electromagnetic radiation of an optical nature (UV, visible, IR) with a medium with plane and parallel surfaces, which is homogeneous, isotropic, non-luminescent and non-scattering, observed from the inside.

Table 2 is in line with the scope of this International Standard and therefore concerns the interaction of a beam of monochromatic luminous radiation striking, at normal incidence, a medium consisting of a solution which is homogeneous, isotropic, non-luminescent and non-diffusing contained in an optical cell (with two plane and parallel surfaces). In table 2

— terms 14 and 15 relate to the theoretical aspect, and are a simple adaptation of terms 9 and 11 to the special case of molecular absorption spectrometry;

— terms 16 to 20 relate to actual phenomena and measurements;

— terms 21 and 22 relate to the method of expression of results.

A list of the French terms equivalent to those defined in tables 1 and 2 is given in the annex.

3 General

Molecular absorption spectrometry obeys the following laws.

3.1 Lambert-Bouguer's law

When a parallel beam of monochromatic radiation of flux Φ_0 traverses, at normal incidence, an absorbing medium with plane, parallel surfaces and which is homogeneous, isotropic, non-luminescent and non-scattering, over an optical path length b, the transmitted flux Φ_{tr} is given by the equation

$$\Phi_{tr} = \Phi_0 \, e^{-kb}$$

where

e is the base of natural logarithms;

k is a linear absorption coefficient.

This equation is derived from integration of the differential equation

$$d\Phi_{tr} = - k \, \Phi_{tr} \, dx$$

where x varies from 0 to b, $d\Phi_{tr}$ is the reduction in radiant energy flux along an infinitely small optical path length dx, and Φ_{tr} is the value of the flux at point x.