



Standard Terminology Relating to Molecular Spectroscopy^{1, 2}

This standard is issued under the fixed designation E131; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

2. Referenced Documents

2.1 ASTM Standards:³

E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

E168 Practices for General Techniques of Infrared Quantitative Analysis (Withdrawn 2015)⁴

E204 Practices for Identification of Material by Infrared Absorption Spectroscopy, Using the ASTM Coded Band and Chemical Classification Index (Withdrawn 2014)⁴

E284 Terminology of Appearance

E386 Practice for Data Presentation Relating to High-Resolution Nuclear Magnetic Resonance (NMR) Spectroscopy

E456 Terminology Relating to Quality and Statistics

2.2 Other Documents:⁵

ISO Guide 30–1981 (E) Terms and definitions used in connections with reference materials

3. Terminology

absorbance, A —the logarithm to the base 10 of the reciprocal of the transmittance, (T).

$$A = \log_{10}(1/T) = -\log_{10}T \quad (1)$$

DISCUSSION—In practice the observed transmittance must be substituted for T . Absorbance expresses the excess absorption over that of a specified reference or standard. It is implied that compensation has

been effected for reflectance losses, solvent absorption losses, and refractive effects, if present, and that attenuation by scattering is small compared with attenuation by absorption. Apparent deviations from the absorption laws (see **absorptivity**) are due to inability to measure exactly the true transmittance or to know the exact concentration of an absorbing substance.

absorption band—a region of the absorption spectrum in which the absorbance passes through a maximum.

absorption coefficient, α —a measure of absorption of radiant energy from an incident beam as it traverses an absorbing medium according to Bouguer's law, $P/P_o = e^{-\alpha b}$.

DISCUSSION—In IRS, α is a measure of the rate of absorption of energy from the evanescent wave.

absorption parameter, a —the relative reflection loss per reflection that results from the absorption of radiant energy at a reflecting surface: $a = 1 - R$, and R = the reflected fraction of incident radiant power.

absorption spectrum—a plot, or other representation, of absorbance, or any function of absorbance, against wavelength, or any function of wavelength.

absorptivity, a —the absorbance divided by the product of the concentration of the substance and the sample pathlength, $a = A/bc$. The units of b and c shall be specified.

DISCUSSION—1—The recommended unit for b is the centimetre. The recommended unit for c is kilogram per cubic metre. Equivalent units are g/dm^3 , g/L , or mg/cm^3 .

DISCUSSION—2—The equivalent IUPAC term is “specific absorption coefficient.”

absorptivity, molar, ϵ —the product of the absorptivity, a , and the molecular weight of the substance.

DISCUSSION—The equivalent IUPAC term is “molar absorption coefficient.”

acceptance angle, n —for an optical fiber, the maximum angle, measured from the longitudinal axis or centerline of the fiber to an incident ray, within which the ray will be accepted for transmission along the fiber by total internal reflection.

DISCUSSION—If the incidence angle exceeds the acceptance angle, optical power in the incident ray will be coupled into leaky modes or rays, or lost by scattering, diffusion, or absorption in the cladding. For a clad step-index fiber in the air, the sine of the acceptance angle is given by the square root of the difference of the squares of the refractive indexes of the fiber core and the cladding, that is, by the relation as follows:

¹ This terminology is under the jurisdiction of ASTM Committee E13 on Molecular Spectroscopy and Separation Science and is the direct responsibility of Subcommittee E13.94 on Terminology.

Current edition approved May 1, 2015. Published June 2015. Originally approved in 1957. Last previous edition approved in 2010 as E131 – 10. DOI: 10.1520/E0131-10R15.

² For other definitions relating to nuclear magnetic resonance, see Practice E386.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.