Designation: E 181 – 98 (Reapproved 2003)

Standard Test Methods for Detector Calibration and Analysis of Radionuclides[1]

This standard is issued under the fixed designation E 181; 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 These methods cover general procedures for the calibration of radiation detectors and the analysis of radionuclides. For each individual radionuclide, one or more of these methods may apply.

1.2 These methods are concerned only with specific radionuclide measurements. The chemical and physical properties of the radionuclides are not within the scope of this standard.

1.3 The measurement standards appear in the following order:

	Sections
Spectroscopy Methods:	
Calibration and Usage of Germanium Detectors	3-12
Calibration and Usage of Scintillation Detector Systems:	13-20
Calibration and Usage of Scintillation Detectors for Simple Spectra	16
Calibration and Usage of Scintillation Detectors for Complex Spectra	17
Counting Methods:	
Beta Particle Counting	25-26
Aluminum Absorption Curve	27-31
Alpha Particle Counting	32-39
Liquid Scintillation Counting	40-48

1.4 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Document

2.1 *ASTM Standards:*

E 170 Terminology Relating to Radiation Measurements and Dosimetry[2]

[1] These methods are under the jurisdiction of ASTM Committee E10 on Nuclear Technology and Applications .

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[2] *Annual Book of ASTM Standards*, Vol 12.02.

SPECTROSCOPY METHODS

3. Terminology

3.1 *Definitions:*

3.1.1 *certified radioactivity standard source*—a calibrated radioactive source, with stated accuracy, whose calibration is certified by the source supplier as traceable to the National Radioactivity Measurements System **(1)**.[3]

3.1.2 *check source*—a radioactivity source, not necessarily calibrated, that is used to confirm the continuing satisfactory operation of an instrument.

3.1.3 *FWHM*—(full width at half maximum) the full width of a gamma-ray peak distribution measured at half the maximum ordinate above the continuum.

3.1.4 *national radioactivity standard source*—a calibrated radioactive source prepared and distributed as a standard reference material by the U.S. National Institute of Standards and Technology.

3.1.5 *resolution, gamma ray*—the measured FWHM, after background subtraction, of a gamma-ray peak distribution, expressed in units of energy.

3.2 *Abbreviations:Abbreviations:*

3.2.1 *MCA*—Multichannel Analyzer.

3.2.2 *SCA*—Single Channel Analyzer.

3.2.3 *ROI*—Region-Of-Interest.

3.3 For other relevant terms, see Terminology E 170.

3.4 *correlated photon summing*—the simultaneous detection of two or more photons originating from a single nuclear disintegration.

3.5 *dead time*—the time after a triggering pulse during which the system is unable to retrigger.

NOTE 1—The terms "standard source" and "radioactivity standard" are general terms used to refer to the sources and standards of National Radioactivity Standard Source and Certified Radioactivity Standard Source.

[3] The boldface numbers in parentheses refer to the list of references at the end of these methods.

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