



Standard Practice for Analysis of Metals, Ores, and Related Materials by Spectrophotometry¹

This standard is issued under the fixed designation E60; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice covers general recommendations for photoelectric photometers and spectrophotometers and for photometric practice prescribed in ASTM methods for chemical analysis of metals, sufficient to supplement adequately the ASTM methods. A summary of the fundamental theory and practice of photometry is given. No attempt has been made, however, to include in this practice a description of every apparatus or to present recommendations on every detail of practice in ASTM photometric or spectrophotometric methods of chemical analysis of metals.²

1.2 These recommendations are intended to apply to the ASTM photometric and spectrophotometric methods for chemical analysis of metals when such standards make definite reference to this practice, as covered in Section 4.

1.3 In this practice, the terms “photometric” and “photometry” encompass both filter photometers and spectrophotometers, while “spectrophotometry” is reserved for spectrophotometers alone.

1.4 *This standard does not purport to address all of the safety concerns, 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 Documents

2.1 ASTM Standards:³

E131 Terminology Relating to Molecular Spectroscopy

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

E168 Practices for General Techniques of Infrared Quantitative Analysis

E169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis

E275 Practice for Describing and Measuring Performance of Ultraviolet and Visible Spectrophotometers

3. Definitions and Symbols

3.1 For definitions of terms relating to this practice, refer to Terminology **E135**.

3.2 For definitions of terms relating to absorption spectroscopy, refer to Terminology **E131**.

3.3 Definitions of Terms Specific to this Practice:

3.3.1 *background absorption*—any absorption in the solution due to the presence of absorbing ions, molecules, or complexes of elements other than that being determined is called background absorption.

3.3.2 *concentration range*—the recommended concentration range shall be designated on the basis of the optical path of the cell, in centimetres, and the final volume of solution as recommended in a procedure. In general, the concentration range and path length shall be specified as that which will produce transmittance readings in the optimum range of the instrument being used as covered in Section 14.

3.3.3 *initial setting*—the initial setting is the photometric reading (usually 100 on the percentage scale or zero on the logarithmic scale) to which the instrument is adjusted with the reference solution in the absorption cell. The scale will then read directly in percentage transmittance or in absorbance.

3.3.4 *photometric reading*—the term “photometric reading” refers to the scale reading of the instrument being used. Available instruments have scales calibrated in transmittance, T , **(1)**⁴ or absorbance, A , **(2)** (see 5.2), or even arbitrary units proportional to transmittance or absorbance.

3.3.5 *reagent blank*—the reagent blank determination yields a value for the apparent concentration of the element sought,

¹ This practice is under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.20 on Fundamental Practices.

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² For additional information on the theory and photoelectric photometry, see the list of references at the end of this practice.

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 boldface numbers in parentheses refer to a list of references at the end of this standard.