



Practice for Performance-Based Description of Instruments in Chemical Analysis Methods¹

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1. Scope

1.1 This practice covers procedures for specifying instruments for chemical analysis by performance rather than by design.

1.2 The provisions of this practice do not apply to classical chemical method of analysis.

2. Referenced Documents

2.1 ASTM Standards:

E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials²

E 396 Test Method for Chemical Analysis of Cadmium³

E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry³

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method³

E 1763 Guide for Interpretation and Use of Results from Interlaboratory Testing of Chemical Analysis Methods³

E 1914 Practice for the Use of Terms Relating to the Development and Evaluation of Methods of Chemical Analysis³

E 2055 Practice for Referencing Methods for Chemical Analysis of Metals and Related Materials³

3. Terminology

3.1 *Definitions*—For definitions and use of terms used in this practice, refer to Terminology E 135 and Practice E 1914.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *classical analytical method, n*—a method based upon classical analytical measurements, that is, weight (as by analytical balance), volume (as by buret), or both.

3.2.2 *instrumental analytical method, n*—a method based upon analytical measurements other than those employed in classical methods.

3.2.3 *minimum instrument sensitivity index, MISI, n*—a

figure of merit used to compare sensitivity of instruments at low analyte levels.

3.2.4 *relative instrument sensitivity index, RISI, n*—a figure of merit used to compare sensitivity of instruments at elevated analyte levels.

4. Summary of Practice

4.1 The author or a task group conducting an interlaboratory study (ILS) examines a measuring instrument to determine which components and operations contribute to imprecision of results. The task group collects ILS data and calculates values for criteria that define acceptable operation of those components. Instrument tests and critical values are written into the Apparatus section. Before applying a method, users verify that an instrument meets the specified performance criteria.

5. Significance and Use

5.1 Instrumental methods specify measurement apparatus by name and a brief design description. An instrument designed differently than described may provide equivalent measurements. Relying solely on design specifications sometimes excludes instruments capable of the required performance.

5.2 This practice requires each method to specify tests and criteria to measure critical performance characteristics of an instrument. The tests provide verification that a user's instrument is capable of producing results that reflect the precision stated in the method.

5.3 Any instrument designed to measure the physical properties in the specified analytical systems may be used in a method if it meets the performance criteria. If an instrument's performance does not meet the criteria, a user may still apply the method, but is warned that results may have greater variability than is specified in the method. (**Warning**—Meeting instrument performance criteria does not guarantee expected precision and accuracy. The tests warn only of excessive instrumental error. A user shall employ reference materials in accordance with Practice E 2055 and adhere strictly to all requirements of a method to obtain results in accordance with its Precision and Bias section.)

5.4 Classical analytical methods are not covered by this practice.

¹ This practice is under the jurisdiction of ASTM Committee E-1 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.22 on Statistics and Quality Control.

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² Annual Book of ASTM Standards, Vol 03.05.

³ Annual Book of ASTM Standards, Vol 03.06.