Designation: E 1024 – 97 (Reapproved 2004)

Standard Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry[1]

This standard is issued under the fixed designation E 1024; 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 This guide covers general recommendations for the use of atomic absorption spectrophotometers in the flame mode for the chemical analysis of metals and metal bearing ores by ASTM methods.

1.2 *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:* [2]

E 50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials

E 863 Practice for Describing Flame Atomic Absorption Spectroscopy Equipment

E 1452 Practice for Preparation of Calibration Solutions for Spectrophotometric and for Spectroscopic Atomic Analysis

E 1812 Practice for Optimization of Flame Atomic Absorption Spectrometric Equipment

3. Significance and Use

3.1 The precision and accuracy of atomic absorption analyses are influenced by many factors. Most important of these factors are the proper preparation of the test solutions, the proper selection and preparation of calibration solutions, and instrument-related factors, such as proper setting of instrument parameters, the proper sequence of calibration and test solution measurements, and correct interpretation of the instrument's response. An ASTM method that refers to this guide specifies the procedures for preparation of test and calibration solutions. This guide gives the instrument-related procedures for using the atomic absorption spectrophotometer in the flame mode and calculating the results.

3.2 Because atomic absorption spectrophotometers vary greatly in their sensitivity for any specific element, the concentration ranges for test and calibration solutions given in each method must be considered only a guide for analysts who are not familiar with the response of their instruments for the element to be determined. Those who know the optimum concentration range of their instrument should prepare calibration solutions based upon that knowledge.

3.3 This guide is based upon simple graphical or mathematical ratio interpolations of instrument response between calibration points. For this reason, the criterion for "curve linearity" is conservative in order to minimize the error introduced by a linear approximation to, or manual graphing of, a markedly curvilinear response. Other methods of relating concentration to instrument response (such as, microprocessor curve-fitting techniques) may be valid for concentrations higher than the limit posed by the "curve linearity" test in this guide. None of these methods have been universally adopted and each method that has been proposed achieves its highest precision only in dealing with certain cases. The methods given in this guide are universally applicable. If employed carefully, they will provide satisfactory precision and accuracy.

4. Interferences

4.1 Chemical and spectral interferences from sample matrix elements and solvent medium anions are common. The standard method that references this guide will have provided the appropriate remedy: prechemical isolation of the analyte species, the addition of matrix-modifying reagents, or the specification of special calibration procedures.

4.2 Ionization of the analyte element in the flame is a frequent problem since only ground-state atoms are measured. If this effect is significant, the standard method that references

[1] This guide 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.

Current edition approved July 1, 2004. Published August 2004. Originally approved in 1984. Last previous edition approved in 1997 as E 1024 – 97.

[2] 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.