



Designation: E 1446 – 92 (1997)^{ε1}

Standard Test Method for Chemical Analysis of Refined Gold by Direct Current Plasma Emission Spectrometry¹

This standard is issued under the fixed designation E 1446; 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.

^{ε1} NOTE—E 1446 was reapproved with a title change in April 1997.

1. Scope

1.1 This test method covers the analysis of refined gold for the following elements having the following chemical composition limits:

Element	Concentration Range, ppm
Copper	17 to 300
Iron	6 to 150
Lead	17 to 100
Palladium	7 to 350
Silver	17 to 500

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.* For specific precautionary statements, see Section 8.

2. Referenced Documents

2.1 ASTM Standards:

B 562 Specification for Refined Gold²

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals⁴

E 173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals⁴

E 691 Practice for Conducting An Interlaboratory Study to Determine the Precision of a Test Method³

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁵

E 1097 Guide for Direct Current Plasma Emission Spectrometry Analysis⁵

¹ This test method 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 E01.03 on Precious Metals.

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² Annual Book of ASTM Standards, Vol 02.04.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Annual Book of ASTM Standards, Vol 03.05.

⁵ Annual Book of ASTM Standards, Vol 03.06.

3. Summary of Test Method

3.1 The sample is dissolved with acids. Calibration solutions are prepared from pure reagents to match the sample matrix. Analysis is performed with the d-c argon plasma optical emission spectrometer. Element concentrations are measured by comparing emission intensities from the sample with those of the calibration solutions. Copper is measured at 327.3 nm or 324.7 nm; iron at 259.9 nm; lead at 405.7 nm; palladium at 340.4 nm; and silver at 328.0 nm or 338.3 nm.

4. Significance and Use

4.1 This test method for the analysis of fine gold is primarily intended to test such material for compliance with compositional specifications. It is assumed that all who use this test method will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory.

5. Interferences

5.1 Spectral line interferences and spectrochemical background effects are overcome by preparing a matrix-matched calibration standard series to approximate the prepared sample.

5.2 The analyte wavelengths mentioned herein have been previously evaluated for spectral line interferences and found to be the optimum emission wavelengths for refined gold sample testing. Alternative wavelengths, if shown to be free of interferences, may also be used.

6. Apparatus

6.1 *D-C Argon Plasma Optical Emission Spectrometer*—The instrument must be equipped with a sample nebulization system compatible with mineral acids and with test solutions containing 4 % total solids. Follow the manufacturer's instructions for installation and operation.

7. Reagents and Materials

7.1 *Argon*—Purity: 99.998 % minimum.

7.2 *Copper Standard Solution* (1 mL = 1.0 mg Cu)—Transfer 1.000 g of copper metal (purity: 99.9 % minimum) to a 400-mL beaker. Add 60 mL of HNO₃(1+1) in 10-mL