



Standard Test Method for Spectrographic Analysis of Silver by the Powder Technique¹

This standard is issued under the fixed designation E 378; 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 test method covers the spectrographic analysis of silver for the following elements in the ranges indicated:

Element	Concentration Range, %
Copper	0.0001 to 0.1
Lead	0.0001 to 0.05
Zinc	0.001 to 0.01
Bismuth	0.0001 to 0.01
Palladium	0.001 to 0.005
Chromium	0.0001 to 0.005
Iron	0.0001 to 0.005
Nickel	0.0001 to 0.005
Manganese	0.0001 to 0.005
Tin	0.0001 to 0.005

1.2 This test method is designed for the analysis of commercial and high-purity silver samples in the form of needles, chips, cast bars, or sheet stock.

1.3 *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:

B 413 Specification for Refined Silver²

E 50 Practices for Apparatus, Reagents and Safety Precautions for Chemical Analysis of Metals³

E 115 Practice for Photographic Processing in Optical Emission Spectrographic Analysis³

E 116 Practice for Photographic Photometry in Spectrochemical Analysis³

E 130 Practice for Designation of Shapes and Sizes of Graphite Electrodes³

E 135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials³

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 03.05.

E 409 Practice For Description and Performance of the Microphotometer⁴

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology E 135.

4. Summary of Test Method

4.1 Samples and standards are prepared in the form of dry silver nitrate powder and packed into the craters of specially shaped graphite cup electrodes. The spectra are produced using dc arc excitation and recorded photographically. Intensity ratios of selected pairs of analytical lines and internal standard lines are determined photometrically. Concentrations are read from an analytical curve relating log intensity ratio to log concentration.

5. Significance and Use

5.1 Refined silver is marketed on purity. This test method is suitable for analysis of refined silver for compliance with Specification B 413.

6. Apparatus

6.1 *Excitation Source* providing a 12-A dc arc.

6.2 *Spectrograph* having sufficient resolving power and linear dispersion to separate the analytical lines from other lines in the spectrum of the sample in the spectral region from 2500 to 3500 Å. An instrument having a reciprocal linear dispersion of 5 to 10 Å/mm in the first order satisfies these conditions.

6.3 *Photographic Processing Equipment* providing development, fixing, washing, and drying operations and conforming to the requirements of Practice E 115.

6.4 *Microphotometer* conforming to criteria of Practice E 409.

6.5 *Calculating Board* to convert microphotometer readings to log intensity ratios and concentrations.

7. Reagents and Materials

7.1 *Purity and Concentration of Reagents*—The purity and concentration of the chemical reagents used in preparing the

⁴ Annual Book of ASTM Standards, Vol 03.06.