



Designation: E 945 – 02

Standard Test Method for Determination of Zinc in Zinc Ores and Concentrates by Complexometric Titrimetry¹

This standard is issued under the fixed designation E 945; 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 determination of zinc in ores, concentrates, and related materials having chemical composition within the following limits:

Element	Concentration Range, %
Zinc	5.0 to 70.0
Lead	0.5 to 50.0
Copper	0.1 to 3.0
Iron	0.5 to 16.0
Sulfur	4.0 to 30.0
Calcium	0.1 to 20.0
Magnesium	0.1 to 10.0
Cadmium	0.1 to 8.0
Arsenic	0.01 to 1.0
Antimony	0.01 to 0.005
Bismuth	0.001 to 0.1
Cobalt	0.1 to 0.5
Nickel	0.3 to 3.0
Silver	0.00 to 150 oz/ton
Gold	0.00 to 1.0 oz/ton

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:

- D 1193 Specification for Reagent Water²
- 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 135 Terminology Relating to Analytical Chemistry for Metals, Ores and Related Materials⁴
- E 173 Practice for Conducting Interlaboratory Studies of

Methods for Chemical Analysis of Metals⁵

E 663 Practice for Flame Atomic Absorption Analysis⁶

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory⁶

E 1024 Guide for Chemical Analysis of Metals and Metal Bearing Ores by Flame Atomic Absorption Spectrophotometry⁶

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method⁴

3. Terminology

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

4. Summary of Test Method

4.1 The sample, after appropriate acid decomposition, is evaporated to near dryness. The salts are dissolved in acid, interfering elements are removed, and the zinc is extracted as thiocyanate complex into MIBK. Zinc is determined in the extract by titrating with EDTA, using an internal indicator.

5. Significance and Use

5.1 This test method is primarily intended to test materials for compliance with compositional specifications. It is assumed that all who use this test method will be trained analysts working in properly equipped laboratories.

5.2 Appropriate quality control practices shall be followed such as those described in Guide E 882.

6. Interferences

6.1 With the exception of cadmium and cobalt, elements do not interfere if their concentrations are under the maximum limits shown in 1.1.

6.2 When the cadmium content is above 5.0 % in the material to be analyzed, some of the cadmium is extracted and will titrate as zinc. The addition of potassium iodide before the titration serves to prevent the interference of cadmium. The amount of potassium iodide solution to add in order to prevent the interference of cadmium is listed in 13.10.3.

6.3 Cobalt is extracted and titrated with the zinc. If the cobalt content of the material to be analyzed is less than

¹ This test method is under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.02 on Ores, Concentrates, Refractories, Cement, and Related Metallurgical Materials.

Current edition approved March 10, 2002. Published April 2002. Originally published as E 945 – 83. Last previous edition E 945 – 96.

² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ *Annual Book of ASTM Standards*, Vol 03.05.

⁵ Discontinued; see 1997 *Annual Book of ASTM Standards*, Vol 03.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.06.