



Standard Test Methods for Determination of Gold in Cyanide Solutions¹

This standard is issued under the fixed designation E1600; 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 These test methods cover the determination of gold in ore processing cyanide solutions within the following ranges:

Method	Application Range, $\mu\text{g/mL}$
Inductively Coupled Plasma Mass Spectrometry	0.001 to 0.500
Flame Atomic Absorption Spectrometry	0.300 to 10.0

NOTE 1—The lower limit for the Inductively Coupled Plasma Mass Spectrometry Method, 0.001 $\mu\text{g/mL}$, was set following the guidance of Practice E1601. The reproducibility Index, R, was calculated using the total standard deviation for the lowest concentration Youden pair solution.

1.1.1 These test methods may also be applied to cyanide leach solutions from metallurgical evaluation procedures.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 The test methods appear in the following order:

Method	Sections
Flame Atomic Absorption Spectrometry	9 – 16
Inductively Coupled Plasma Mass Spectrometry	17 – 24

1.4 *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.* Specific precautions are given in 11.1, 11.1.1, 11.5, and 12.2.

2. Referenced Documents

2.1 *ASTM Standards:*²

D1193 Specification for Reagent Water

D1293 Test Methods for pH of Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

¹ These test methods are under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and are the direct responsibility of Subcommittee E01.02 on Ores, Concentrates, and Related Metallurgical Materials.

Current edition approved April 1, 2015. Published May 2015. Originally approved in 1994. Last previous edition approved in 2013 as E1600 – 13. DOI: 10.1520/E1600-15.

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.

D5673 Test Method for Elements in Water by Inductively Coupled Plasma—Mass Spectrometry

D6888 Test Method for Available Cyanide with Ligand Displacement and Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection

D7237 Test Method for Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials

E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

E173 Practice for Conducting Interlaboratory Studies of Methods for Chemical Analysis of Metals (Withdrawn 1998)³

E882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory

E1060 Practice for Interlaboratory Testing of Spectrochemical Methods of Analysis (Withdrawn 1997)³

E1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method

3. Terminology

3.1 *Definitions*—For definitions of terms used in these test methods, refer to Terminology E135.

4. Significance and Use

4.1 In primary metallurgical processes for gold bearing ores, gold is extracted with an alkaline cyanide solution. Metallurgical accounting, process control, and ore evaluation procedures depend on accurate, precise, and prompt measurements of the gold concentrations.

4.2 These test methods are comparative referee methods for compliance with compositional specifications for metal concentration or to monitor processes. It is assumed that all who use these methods will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is

³ The last approved version of this historical standard is referenced on www.astm.org.