



Designation: E 1938 – 97

Standard Test Method for Determination of Titanium in Nickel Alloys by Diantipyrylmethane Molecular Absorption Spectrometric Method¹

This standard is issued under the fixed designation E 1938; 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 titanium in nickel alloys in the 0.3 through 5.0 % range. With appropriate reference materials the test method may be extended down to 0.05 %.

1.2 Molybdenum, if present, may cause a high bias to the extent of 0.001 % Ti for every 1 % Mo.

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.* For specific hazards associated with the use of this test method see Practices E 50.

2. Referenced Documents

2.1 ASTM Standards:

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals²

E 882 Guide for Accountability and Quality Control in the Chemical Analysis Laboratory³

E 1452 Practice for Preparation of Calibration Solutions for Spectrophotometric and for Spectroscopic Atomic Analysis³

E 1601 Practice for Conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method³

2.2 ISO Standards:

ISO 5725:1986 - Precision of Test Methods – Determination of Repeatability and Reproducibility for a Standard Test Method by Inter-Laboratory Tests⁴

ISO 11433:1993(E) - Nickel Alloys - Determination of

Titanium Content - Diantipyrylmethane Molecular Absorption Spectrometric Method⁴

3. Summary of Test Method

3.1 This sample is dissolved in a mixture of hydrochloric and nitric acid. The solution is evaporated to sulfuric acid fumes to remove the hydrochloric and nitric acids. Color is developed with diantipyrylmethane, and the absorbance is measured at 390 nm.

4. Significance and Use

4.1 This practice is used for the analysis of nickel and nickel base alloy samples by molecular absorption spectrometry to check compliance with compositional specifications. It is assumed that all who use the procedure will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that the work will be performed in a properly equipped laboratory and that proper waste disposal procedures will be followed. Appropriate quality control practices must be followed such as those described in Guide E 882.

5. Apparatus

5.1 *Spectrophotometer*, capable of measuring absorbance at a wavelength of 390 nm.

5.2 *Cells*, to fit spectrophotometer, having an optical path of 1 cm.

NOTE 1—Cells having other dimensions can be used, provided suitable adjustments can be made in the amount of sample and reagents used.

6. Reagents

6.1 *Purity and Concentration of Reagents*—The purity and concentration of common chemical reagents shall conform to Practices E 50. The reagents should be free of or contain only minimal amounts (< 0.1 µg/g) of titanium. Calibration solutions shall be prepared in accordance with Practice E 1452.

6.2 *Potassium Hydrogen Sulfate* (KHSO₄).

6.3 *Ascorbic Acid Solution*—Dissolve 20 g ascorbic acid (C₆H₈O₆) in water, dilute to 200 mL and mix.

¹ This test method is under the jurisdiction of ASTM Committee E-1 on Analytical Chemistry of Metals, Ores and Related Materials, and is the direct responsibility of Subcommittee E01.08 on Nickel, Cobalt and High Temperature Alloys.

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² Annual Book of ASTM Standards, Vol 03.05.

³ Annual Book of ASTM Standards, Vol 03.06.

⁴ Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.