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Designation: E 1941 – 98

Standard Test Method for Determination of Carbon in Refractory and Reactive Metals and Their Alloys[1]

This standard is issued under the fixed designation E 1941; 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 applies to the determination of carbon in refractory and reactive metals and their alloys in concentrations from 0.004 to 0.100 % (see Note 1).

NOTE 1—Actual instrument range might vary from manufacturer to manufacturer and according to sample size.

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.* Specific precautionary statements are given in Section 8.

2. Referenced Documents

2.1 *ASTM Standards:*

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.[2]

E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals[3]

E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for the Determination of Chemical Composition[3]

E 1601 Practice for conducting an Interlaboratory Study to Evaluate the Performance of an Analytical Method[4]

E 456 Terminology for Statistical Methods[2]

E 1019 Test Methods for Determination of Carbon, Sulfur, Nitrogen, Oxygen, and Hydrogen in Steel and in Iron, Nickel, and Cobalt Alloys.[4]

3. Summary of Test Method

3.1 The metal specimen, contained in a single-use ceramic crucible, is ignited in an oxygen atmosphere in an induction furnace. The carbon in the specimen is oxidized to carbon dioxide or carbon monoxide, or both, and is eventually carried to the analyzer/detector. The amount of carbon present is electronically processed and is displayed by the analyzer readout.

3.2 This test method is written for use with commercially available analyzers equipped to carry out the above operations and calibrated using commercially available standards of known carbon content.

4. Significance and Use

4.1 This test method is intended to test for compliance with compositional specifications. It is assumed that all who use this method 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.

5. Interferences

5.1 The elements ordinarily present in these alloys do not interfere. Halides that are present in some sponge type samples will cause low carbon recovery.

6. Apparatus

6.1 *Combustion Furnace and Measurement Apparatus*, automatic carbon determinator, consisting of an induction furnace; a dust/debris removal trap; an analytical gas stream purification system; an infrared detection system; and an automatic readout (see Note 2).

NOTE 2—Several models of commercial carbon determinators are available and presently in use in industry. Each has its own unique design characteristics and operational requirements. Consult the instrument manufacturer's instruction manuals for operational details.

6.2 *Oxygen Tank and Regulator*.

6.3 *Ceramic Crucibles and Lids*, that meet or exceed the instrument manufacturer's specifications. Use lids with holes in them.

6.4 *Crucible Tongs*, capable of handling recommended crucibles.

6.5 *Balance*, capable of weighing to the nearest milligram.

[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 E01.06 on Titanium, Zirconium, Tungsten, Molybdenum, Tantalum, Niobium, Hafnium, and Rhenium.

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[2] *Annual Book of ASTM Standards*, Vol 14.02.

[3] *Annual Book of ASTM Standards*, Vol 03.05.

[4] *Annual Book of ASTM Standards*, Vol 03.06.

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