U. S. Department of Commerce
Malcolm Baldrige
Secretary

National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 1090

Oxygen in Ingot Iron

This Standard Reference Material (SRM) is intended for use in the evaluation of methods and the calibration of equipment used in the determination of oxygen in iron or ferrous materials. SRM 1090 is in the form of an ingot iron rod, 0.635 cm in diameter and 10.2 cm long (1/4 in. diameter and 4 in. long).

The oxygen content of SRM 1090 was determined by three independent methods of analysis, namely vacuum fusion, inert gas fusion, and 14 MeV neutron activation analysis. A single certified value is not reported because of small but undetermined systematic biases which exist in one or more of the methods used. Therefore, all the analytical data are presented in tabular form below.

	Oxygen Content, μg/g		
	Vacuum Fusion	14 MeV Neutron Activation	Inert Gas Fusion
$\bar{x}$ =	484	492	497
s^a =	14	28	13
n =	216	6	12

$\bar{x}$ = mean oxygen value; s = standard deviation of a single determination; n = number of independent determinations

[a]The standard deviation includes error due both to the imprecision of the analytical method and to possible heterogeneity of the material analyzed.

NOTE: Oxygen determinations should be made on thoroughly and freshly cleaned samples that represent the full cross-section of the rod.

Preparation, Testing and Analysis

The base material for SRM 1090 is ingot iron that was obtained from the Armco Steel Corporation. It was supplied as 0.635 cm diameter centerless ground rods approximately 91 cm long (1/4 in. and 3 feet long) from a single heat preparation. It is a low alloy material with a low carbon content and relatively high oxygen content. The nominal composition of this material is as follows: C = 0.026%, Mn = 0.043%, P = 0.004%, S = 0.016%, Si = 0.004%, Cu = 0.095%.

The analyses reported in this certificate were performed by staff members of the Center for Analytical Chemistry, National Bureau of Standards.

Additional technical information on this SRM, including the names of cooperators who participated in the original analysis, is in NBS Publication 260-14, Standard Reference Materials: Determination of Oxygen in Ferrous Materials; SRM's 1090, 1091 and 1092 (1966).

November 1, 1985
Gaithersburg, MD 20899
(Revision of Certificates
dated 3-1-66 & 4-2-69)

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(Over)

SUPPLEMENTARY INFORMATION

Although not certified, the nitrogen content of this SRM was determined by the analytical methods shown below:

Methods of Analysis	Nitrogen (ppm by weight)		
	$\bar{x}$	s	n
Acid digestion-distillation-indophenol-photometry	61.5	3.5	14
Pressure bomb-distillation-indophenol-photometry	59.4	2.0	4
Vacuum Fusion	60	1	15

The symbols $\bar{x}$, s, and n have the same meaning as given for the oxygen determinations.