U. S. Department of Commerce
Alexander B. Trowbridge,
Secretary

National Bureau of Standards
A. V. Astin, Director

Certificate of Analysis

Standard Reference Materials 680 and 681

High-Purity and Doped Platinum [1]

[NOTE: These materials are issued as interim standards to meet the needs of analysts working at trace level concentrations in platinum. The range of values reported represents the present state of the art in the cooperating laboratories.]

Element [2]	SRM #680 High-Purity		SRM #681 Doped	
	Recommended Value	Range of Values Reported	Recommended Value	Range of Values Reported
	Concentration in Parts per Million by Weight [3]			
Copper	0.1	(0.087 — <1)	5.1[a]	(2 — 6.3)
Silver	<0.1	(<0.06 — <1)	2.0[a]	(1.4 — 2.1)
Palladium	0.2	(<0.1 — <1)	6[b]	(4.0 — 6.1)
Lead	<1	(0.6 — 3)	12[c]	(8.5 — 15)
Iron	0.7	(0.6 — 2.6)	5	(3.5 — 12)
Nickel	<1	(0.3 — <1)	0.5	(0.5 — < 1)
Gold	<1	(<0.1 — 8)	9	(5 — 10)
Magnesium	<1	(<0.05 — 2)	12	(4.7 — 15)
Zirconium	<0.1	(<0.03 — 0.3)	11	(10.6 — 11.5)
Rhodium	<0.2	(0.09 — 1)	9	(5.2 — 10)
Iridium	<0.01	(0.007 — 0.01)	11	(5 — 18)
Oxygen	4	(3.2 — 5.2)*	7	(6.1 — 9.5)*

* Range from one laboratory only.

1. The platinum materials are in the form of wire 0.020 inch (0.51 mm) in diameter and are available in two lengths, 4 inches (10.2 cm) designated L–1 and 39.4 inches (1.0 m) designated L–2.
2. Other elements are also contained in the standards; some of them such as Al, Ca, Na, Si, and Sn may be certified at a later date.
3. The values listed are based on a consideration of the analytical methods and results reported by cooperating laboratories. Elements are listed in order of decreasing estimated accuracy for SRM 681. Close agreement among results from laboratories using different, reliable methods increases the degree of confidence in the recommended values, making possible estimates of accuracy for the following elements.
   a. For Cu and Ag in SRM 681, values are estimated to be within 0.5 ppm of the actual value.
   b. For Pd in SRM 681, values are estimated to be within 1 ppm of the actual value.
   c. For Pb in SRM 681, values are estimated to be within 2 ppm of the actual value.
   For other elements in SRM 681 and all elements in SRM 680, either because a single method was used or because of lack of agreement among methods, no estimate of accuracy can be made at this time. However, in about six months a revised certificate will be issued in which an attempt will be made to give estimate of accuracy.

Washington, D. C. 20234
December 28, 1967

W. Wayne Meinke, Chief
Office of Standard Reference Materials

(over)

These standards have been established to provide homogeneous reference materials for the analysis of high-purity platinum, a material with extensive scientific and industrial applications, but a material the properties of which are greatly affected by the kind and amount of impurity elements. In cooperation with the National Bureau of Standards, the planning, preparation, homogeneity testing and analyses programs were conducted by the following organizations: Sigmund Cohn; Johnson, Matthey & Co., Ltd.; Engelhard Industries, Inc.; and RCA Laboratories.

The material for SRM No. 680 was prepared at Sigmund Cohn by induction melting of high-purity platinum sponge in a zirconium silicate crucible, and by casting into a platinum-lined, water-cooled copper mold. The ingot was trimmed, swaged, and drawn into wire using the utmost precautions to minimize contamination.

The material for SRM No. 681 was prepared at Engelhard Industries by induction melting under helium of high-purity platinum and a specially prepared pilot alloy containing the desired dopant elements. The melt was cast into a graphite mold and the ingot processed in a manner similar to SRM 680.

Extensive homogeneity testing was performed by NBS Washington and Boulder as well as by the four cooperating laboratories listed above using a combination of the following methods: optical emission and spark source mass spectrographic analyses; and electrical measurements including EMF, Temperature Coefficient of Resistivity (T.C.R.), and Residual Resistivity Ratio (RRR). Both lots of material were found to be homogeneous within the limits of precision of the analytical methods used at these trace levels. Elemental analyses were made at the National Bureau of Standards by one or more of the following methods: optical emission spectrography, spark source mass spectrography (isotopic dilution), polarography, spectrophotometry, activation analysis, and vacuum fusion.

Cooperating in this elemental analysis program were the following organizations who contributed emission spectrographic measurements:

J. Bishop & Co., Malvern, Pennsylvania
Engelhard Industries, Newark, New Jersey
Johnson, Matthey & Co., Ltd., London, England

CAUTION

Before use, it is recommended that possible surface contamination be removed by placing the sample in warm aqua regia (3 HCl + 1 HNO_3) for approximately five minutes, and then followed by rinsing in distilled water.