U. S. Department of Commerce
C. R. Smith
Secretary
National Bureau of Standards
A. V. Astin, Director

Certificate of Analysis

Standard Reference Material 480

Tungsten–20% Molybdenum Alloy

Electron Microprobe Standard

SRM No.	Tungsten	Molybdenum
	weight percent	
480	78.5	21.5

This standard is a composite consisting of a core of W–20 wt % Mo alloy wire (1 mm diameter), embedded in pure Mo rod (5 mm diameter) onto which has been electroplated a layer of pure W (1 mm thick). Each standard is 1 mm thick.

Chemical analyses were performed by the Analytical Chemistry Division, NBS. Two independent methods were employed the first of which utilized an ion exchange separation, followed by gravimetric determination of the ignited oxides. An average value of 78.5 wt % was obtained for W with a standard deviation for a single determination of ± 0.3 wt % (n = 4). For Mo the average value obtained was 21.5 wt % with a standard deviation of ± 0.2 wt % (n = 4). Analyst – R. K. Bell. A spectrophotometric thiocyanate method was used for the determination of Mo only. In this method, Mo was reduced with Sn^{+2} and the color system stabilized with butyl cellosolve. An average value of 21.7 wt % was obtained with a standard deviation for the single determination of ± 0.2 wt % (n = 6). Analyst – E. R. Deardorff.

Homogeneity testing by means of the NBS electron microprobe was performed on four selected samples of the composite rod using an operating voltage of 20 kV, a monitor current (proportional to beam current) of 2 microamperes corresponding to a specimen current of 0.22 microamperes. The Lα lines of the W and Mo were monitored by means of LiF(W) and EDDT(Mo) monochromator – proportional counter channels. The dead time in each channel was 2.3 microseconds. The x–ray emergence angle was was 52.5°. A quantitative raster scanning procedure was employed to obtain the homogeneity data which is summarized in the following table for three of the four samples. Analyst – H. Yakowitz.

Homogeneity Characterization Results

Specimen	Condition	CV – Mo[a]	CV – W[a]	Determinations (each element)
EMS–72	Lightly etched	2.47	1.24	400
EMS–73	Unetched	2.37	1.55	400
EMS–74	Lightly etched	2.54	1.34	500

[a] $CV = \frac{(100)\ (\text{Std. Dev.})}{\text{Mean number of counts}}$

Approximate mean number of counts accumulated for W = 500,000
Approximate mean number of counts accumulated for Mo = 45,000

The material for the standard was prepared in the Lamp Metals and Components Department, General Electric Company, Cleveland, Ohio, through the use of a powder metallurgy process involving high–purity metal powders.

Details of the preparation, testing, and intended use of this standard can be found in NBS Spec. Publ. 260–16, Standard Reference Materials: Homogeneity Characterization of NBS Spectrometric Standards IV: W–20% Mo Alloy Prepared by Powder Metallurgical Methods, H. Yakowitz, R. E. Michaelis, and D. V. Vieth, (in press).

The overall direction and coordination of technical measurements leading to the certification were performed under the chairmanship of J. R. DeVoe.

The technical and support aspects involved in the preparation, certification and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. E. Michaelis.

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W. Wayne Meinke, Chief
Office of Standard Reference Materials