

U. S. Department of Commerce  
Frederick B. Dent  
Secretary

National Bureau of Standards  
Richard W. Roberts, Director

**National Bureau of Standards**  
**Certificate of Analysis**  
**Standard Reference Material 276**  
**Tungsten Carbide**

This Standard Reference Material, in the form of a powder screened through a 44  $\mu\text{m}$  (325 mesh) sieve, is certified primarily for use in the carbide industry.

Percent by Weight

Total Carbon

6.09<sup>a</sup>  $\pm$  0.03<sup>b</sup>

<sup>a</sup> This value is the present best estimate based upon the accepted data and methods used in the analytical program for certification. The standard error of the certified value based on method imprecision was 0.005 percent.

<sup>b</sup> The estimated overall uncertainty, 0.03 percent, is based on imprecision of the methods, biases among laboratories, and possible material variability.

This material was analyzed by five cooperating laboratories which used either the chromatographic or the direct combustion gravimetric method. With the exception of one laboratory, the averages are consistent with the certified value.

The overall coordination of the technical measurements at NBS leading to certification was performed under the direction of O. Menis and J. I. Shultz.

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 and C. L. Stanley.

Washington, D. C. 20234  
April 25, 1974

J. Paul Cali, Chief  
Office of Standard Reference Materials

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### Supplementary Information

Planning, preparation, testing and analysis: The material for this SRM was carefully selected and prepared to reflect the present composition needs of the carbide industry. The preparation and preliminary testing were under the supervision of R. A. Long, Chemical and Metallurgical Division, GTE Sylvania Incorporated, Towanda, Pennsylvania. The lot was thoroughly blended and screened in the laboratories at Sylvania and further screened and blended at NBS. Homogeneity testing was performed on seven selected samples, representative of the final lot. The results showed the material to be homogeneous (within the uncertainty indicated in footnote b above).

Cooperative analyses for certification were performed in the analytical laboratories of General Electric Company, Detroit, Michigan, F. Iannaci; GTE Sylvania, Inc., Chemical and Metallurgical Division, Towanda, Pennsylvania, R. A. Long; Leco Laboratory Equipment, St. Joseph, Michigan, G. H. Helling; and Westinghouse Electric Corporation, Research and Development Center, Pittsburgh, Pennsylvania, F. P. Byrne.

Analyses were performed in the Analytical Chemistry Division at NBS by S. A. Wicks.

The material tends to agglomerate. However, a moisture test indicates less than 0.02 percent loss in weight after 2 1/2 hours at 145 °C. The values reported for free carbon ranged from 0.02 to 0.10 percent.

Additional work on this material is planned which will lead to the certification of free carbon. If in the use of this SRM, values are obtained for free carbon, it would be appreciated if the results were forwarded to the Office of Standard Reference Materials.