U. S. Department of Commerce
Malcolm Baldrige
Secretary
National Bureau of Standards
Ernest Ambler, Director

Certificate of Calibration

Iron Foil Mossbauer Standard 1541

This standard reference material is certified for use in Mossbauer spectrometry to calibrate the spectrometer velocity and for the determination of the isomer shift in iron compounds. The SRM is an iron foil whose purity is approximately 99.8 weight percent that includes C, O, and N. The foil, sealed between two plates of a thermoplastic material, is a square 2.5 cm (1 in) on edge and is 23 μm (0.0009 in) thick. The natural iron concentration is 0.018 ± 0.001 g/cm^2. Details on the preparation of this material, a discussion of the measurement errors, the details of the instrumentation, and the measurements themselves, are given in reference 1.

The peak positions shown below are with respect to the center of the doublet of SRM 725 (sodium nitroprusside). The certified peak positions (mm/s) are the averages of 16 determinations made at 25.2 ± 0.2 °C.

Peak Number	Peak Position
1	−5.0494
2	−2.8167
3	−0.5800
4	+1.1007
5	+3.3376
6	+5.5754

For sign convention see reference 1.

The standard deviation of a single determination is 0.0016 mm/s; that of the average, 0.0004 mm/s. Estimates of combined unmeasured systematic errors are not expected to exceed +0.0005 or −0.0002 mm/s.

These data were derived from a least squares fitting of a Lorentzian function to the separate peaks. No interrelation between the peak positions was assumed. Therefore, this SRM is issued provisionally pending completion of a study of systematic errors due to the possibility of alternate mathematical models to that used in the analysis of the spectrum. It is important for the user of this standard to consult reference 1 regarding the mathematical model for line shape used to resolve the spectral data.

The iron foil was prepared by the Hamilton Watch Company, Lancaster, Pennsylvania. B. Christ, Metallurgy Division, Institute for Materials Research, National Bureau of Standards, assisted in arranging for this material and advised throughout its packaging and certification. The calibration of this material was made at the National Bureau of Standards, Institute for Materials Research by J. J. Spijkerman, F. C. Ruegg, J. C. Travis, and J. R. DeVoe.

The overall coordination of the technical work leading to the certification of this SRM was performed by J. R. DeVoe, Chief, Radiochemical Analysis Section.

Washington, D.C. 20234
October 1, 1981
(Revision of Certificate
dated 3/1/71)

George A. Uriano, Chief
Office of Standard Reference Materials

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The certified values are those obtained with the NBS spectrometer. The cooperators' results were used to corroborate the NBS results. The following scientists cooperated in the certification work:

Prof. R. Fritz
Westfalische Wilhelms Universitat
Munster, Germany

Dr. Ronald W. Grant
North American Rockwell Science Center
Thousand Oaks, California

Prof. U. Gonser
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Prof. James Mullen
Purdue University
Lafayette, Indiana

Prof. Paul Flinn
Carnegie Institute of Technology
Pittsburgh, Pennsylvania

Dr. C. E. Violet
Lawrence Radiation Laboratory
Livermore, California

Reference

[1] NBS Special Publication 260-13, Standards for Mossbauer Spectroscopy of Iron Compounds, U. S. Government Printing Office, Washington, D. C. (A revised publication will appear in January 1972.)

Directions for Use

The standard reference material is sealed between two 0.38 mm (0.015 in) thick plates of a thermoplastic material. Because the iron foil should be protected from moisture, it should not be removed from this container. The sample can be mounted by clamping on the edges. Excessive bending or deformation of this material may affect the calibration accuracy. To obtain the highest precision in isomer shift calibration, it is suggested that sodium nitroprusside (SRM 725) be run immediately before this standard without changing velocity settings of the spectrometer.