



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material<sup>®</sup> 991

#### Lead-206 Assay and Isotopic Standard

This Standard Reference Material (SRM) is intended for use as an assay and isotopic standard. SRM 991 consists of a solution of lead nitrate sealed in quartz ampoules. Each ampoule contains a nominal 15 g of solution, 0.5N in nitric acid. The certified isotopic compositions are given below together with the atomic weight of lead.

Molality of Lead: 0.32261 mmol/kg  $\pm$  0.00032 mmol/kg

Isotopic composition:

<sup>204</sup> Pb, Atom Percent	< 0.0003
<sup>206</sup> Pb, Atom Percent	99.979 $\pm$ 0.002
<sup>207</sup> Pb, Atom Percent	0.008 $\pm$ 0.001
<sup>208</sup> Pb, Atom Percent	0.013 $\pm$ 0.001

Atomic Weight: 205.975

The concentration of lead in SRM 991 was determined by an isotope dilution mass spectrometry (IDMS) technique. A correction for isotopic fractionation was checked by analyzing SRM 981. The indicated uncertainty for the concentration is the 95 % tolerance limit [1,2] for coverage of at least 99 % of measured values of this lot of ampoules of SRM 991. The measured values should fall within the indicated tolerance limits with a confidence coefficient of 95 %.

The mass spectrometric measurements were made by L.J. Moore and J.W. Gramlich of the NIST Analytical Chemistry Division. The solutions measured were prepared by L.A. Machlan of the NIST Analytical Chemistry Division.

The overall direction and coordination of the technical measurements leading to certification were under the chairmanship of I.L. Barnes of the NIST Analytical Chemistry Division.

The technical and support aspects concerning the preparation, certification, and issuance of this SRM were coordinated through the Office of Standard Reference Materials by W.P. Reed. Revision of this certificate was coordinated through the NIST Standard Reference Materials Program by B.S. MacDonald of the NIST Measurement Services Division.

*This Certificate of Analysis has undergone editorial revision to reflect program and editorial changes at NIST and the Department of Commerce.*

Willie E. May, Chief  
Analytical Chemistry Division

Robert L. Watters, Jr., Acting Chief  
Measurement Services Division

Gaithersburg, MD 20899  
Certificate Issue Date: 31 August 2004  
*See Certificate Revision History on Last Page*

## REFERENCES

- [1] Cali, J.P.; et al, *The Role of Standard Reference Materials in Measurement System*; NBS Monograph 148 (1975).
- [2] Natrella, M.G.; *Experimental Statistics, Chapter 2*; DBS Handbook 91 (1966).

**Certificate Revision History:** 31 August 2004 (Editorial revisions, uncertainty provided for <sup>206</sup>Pb, and lead isotopic values now expressed in percent); 19 March 1976 (Original certificate date).

*Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet <http://www.nist.gov/srm>.*