

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 1577a

Bovine Liver

This Standard Reference Material (SRM) is intended primarily for use in calibrating instrumentation and evaluating the reliability of analytical methods for the determination of major, minor, and trace elements in animal tissue and other biological matrices.

Certified Values of Constituent Elements: The certified values for the constituent elements are shown in Table 1. Certified values are based on results obtained by definitive methods of known accuracy; or alternatively, from results obtained by two or more independent analytical methods. Noncertified values are given for information only in Table 2.

Notice and Warnings to Users:

Expiration of Certification: This certification is invalid after 5 years from the date of shipping. Should it become invalid before then, purchasers will be notified by NBS.

Stability: The material should be kept in its original bottle and stored at temperatures between 10-30 °C. It should not be exposed to intense sources of radiation. The bottle should be kept tightly closed and stored in a desiccator in the dark.

Use: A minimum sample of 250 mg of the dried material (see Instructions for Drying) should be used for any analytical determination to be related to the certified values of this Certificate.

Dissolution procedures should be designed to effect complete solution, but without losses of volatile elements, such as mercury. Dissolution for these determinations should be carried out in a closed system.

Statistical consultation was provided by K.R. Eberhardt and T.R. Crichton of the Statistical Engineering Division.

The overall direction and coordination of the analyses leading to this certification were under the chairmanship of E.L. Garner, Chief of the Inorganic Analytical Research Division.

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. Alvarez.

Gaithersburg, MD 20899
February 1, 1985
(Revision of Certificates
dated 3-5-82, 6-15-82)

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(over)

Table 1. Certified Values of Constituent Elements

<u>Element</u>	<u>Content,^a (Wt. Percent)</u>
Chlorine	0.28 ± 0.01
Phosphorus	1.11 ± 0.04
Potassium*	0.996 ± 0.007
Sodium	0.243 ± 0.013
Sulfur	0.78 ± 0.01

<u>Element</u>	<u>Content,^a (µg/g)</u>	<u>Element</u>	<u>Content,^a (µg/g)</u>
Arsenic	0.047 ± 0.006	Mercury	0.004 ± 0.002
Cadmium	0.44 ± 0.06	Molybdenum	3.5 ± 0.5
Calcium	120 ± 7	Rubidium*	12.5 ± 0.1
Cobalt	0.21 ± 0.05	Selenium	0.71 ± 0.07
Copper	158 ± 7	Silver	0.04 ± 0.01
Iron	194 ± 20	Strontium*	0.138 ± 0.003
Lead*	0.135 ± 0.015	Uranium*	0.00071 ± 0.00003
Magnesium	600 ± 15	Vanadium*	0.099 ± 0.008
Manganese	9.9 ± 0.8	Zinc	123 ± 8

^aDry weight: For drying instructions, see the section of this Certificate on Instructions for Drying.

The estimated uncertainties are based on judgment and represent an evaluation of the combined effects of method imprecision, possible systematic errors among methods, and material variability for samples weighing 250 mg or more.

*For those elements determined by definitive methods, the uncertainties are given as 95%/95% statistical tolerance limits. See "The Role of Standard Reference Materials in Measurement Systems," NBS Monograph 148, 1975 p 14.

Table 2. Noncertified Values of Constituent Elements

<u>Element</u>	<u>Content,^a (Wt. Percent)</u>
Nitrogen	(10.7)

<u>Element</u>	<u>Content,^a µg/g</u>
Aluminum	(2)
Antimony	(0.003)
Bromine	(9)
Thallium	(0.003)

^aDry weight: For drying instructions, see the section of this Certificate on Instructions for Drying.

Instructions for Drying: Samples of this SRM must be dried before weighing according to the following procedure: Dry for 24 hours at 20 to 25 °C in a vacuum oven at a pressure not greater than 30 Pa (0.2 mm Hg).

Source and Preparation of Material:

The liver for this standard was obtained in the Portland, Oregon, area. The gross fat, major blood vessels, and "skin" were removed and the liver was ground. The ground liver was then mixed, transferred to polyethylene-lined trays, and lyophilized by Oregon Freeze Dry Foods, Inc., Albany, Oregon. After lyophilization, the liver was powdered in a Tornado mill, packaged in moisture-proof bags, and then transported to the National Bureau of Standards.

Analysts and Analytical Methods Used

Analytical Methods:

- A. Atomic absorption spectrometry
- B. Atomic emission spectrometry, flame
- C. Atomic emission spectrometry, inductively coupled plasma
- D. Ion chromatography
- E. Isotope dilution thermal source mass spectrometry
- F. Isotope dilution spark source mass spectrometry
- G. Kjeldahl method for nitrogen
- H. Neutron activation
- I. Polarography
- J. Spectrophotometry

Analysts:

Analytical Chemistry Division, National Bureau of Standards:

- | | |
|--------------------|-----------------------|
| 1. J.V. Bailey | 15. W.R. Kelly |
| 2. I.L. Barnes | 16. H.M. Kingston |
| 3. E.S. Beary | 17. W.F. Koch |
| 4. C.G. Blundell | 18. G.M. Lambert |
| 5. K.A. Brletic | 19. R.M. Lindstrom |
| 6. T.A. Butler | 20. G.J. Lutz |
| 7. E.R. Deardorff | 21. L.A. Machlan |
| 8. M.S. Epstein | 22. E.J. Maienthal |
| 9. J.D. Fassett | 23. T.J. Murphy |
| 10. J.W. Gramlich | 24. P.J. Paulsen |
| 11. R.R. Greenberg | 25. L.J. Powell |
| 12. S. Hanamura | 26. T.C. Rains |
| 13. S.H. Harrison | 27. T.A. Rush |
| 14. E.F. Heald | 28. R.L. Watters, Jr. |
| | 29. R. Zeisler |

Cooperating Analysts:

- 30. M. Gallorini and E. Orvini, Consiglio Nazionale delle Ricerche, Centro di Radiochimica e Analisi per Attivazione presso l' Instituto di Chimica Generale dell'Universita, Pavia, Italy.
- 31. L. Kosta, A.R. Byrne, M. Dermelj, Institute "Josef Stefan", Ljubljana, Yugoslavia: