PREPRINT

U.S. Department of Commerce
Rogers C. B. Morton,
Secretary
National Bureau of Standards
[illegible]est Ambler, Acting Director

National Bureau of Standards Certificate of Analysis

Standard Reference Material 928

Lead Nitrate
(Clinical Standard)

This Standard Reference Material is certified for use as an assay standard for lead. It is intended primarily for use in the calibration and standardization of procedures employed in clinical analysis and for the routine critical evaluation of daily working standards used in these procedures.

Assay . . . . . 100.00 ± 0.03 percent.

The assay shown is based on the determination of lead in the material as received; drying being unnecessary. Lead is precipitated as the chromate using a slight excess of potassium dichromate (SRM 136c). The lead chromate is removed by filtration and the excess chromate ion determined spectrophotometrically. Details of this method are reported elsewhere [1]. The molecular weight of lead nitrate employed in the calculation is 331.219. This value is based on a mass-spectrometrically determined value of 207.209 for the atomic weight of lead in this sample. The uncertainty shown represents two standard deviations of a single measurement based on 16 determinations with allowances for known sources of possible error.

The lead nitrate used for this Standard Reference Material was obtained from the J. T. Baker Chemical Co., Phillipsburg, New Jersey. Chemical analyses were performed by T. J. Murphy and J. W. Gramlich. Spectroscopic analyses were performed by C. S. Annell and D. Golightly of the United States Geological Survey.

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

The technical and support aspects concerning preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by T. W. Mears.

Washington, D.C. 20234 J. Paul Cali, Chief
November 1, 1975 Office of Standard Reference Materials

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This material was examined for compliance with the specifications for reagent grade lead nitrate as given in Reagent Chemicals, 5th edition, published by the American Chemical Society. The material met or exceeded the requirements in every respect.

A semi-quantitative survey for trace metals by emission spectroscopy indicated the following: silver, 2 μg/g; chromium, 3 μg/g; nickel, 3 μg/g. No other metals were detected.

This Standard Reference Material is intended for "in vitro" diagnostic use only.

This material is intended for use as a standard for lead determination in clinical chemistry.

Because of the instability of non-acified aqueous lead solutions at the working levels it is recommended [2] that three levels of concentration be used.

(a) A stock standard solution containing 50 mmol/l is prepared by dissolving 1.6561 g of SRM 928 in ion-free water. If the solution is cloudy or a precipitate forms, add a few drops of ammonium hydroxide. Mix, dilute to 100 ml in a calibrated volumetric flask and transfer immediately to a previously acid-washed, water-rinsed, dry polyethylene bottle. This solution is stable for six months. [2]

(b) An intermediate solution containing 500 μmol/l is prepared by a 1:100 dilution of the above stock solution. This solution may be stored in a capped polyethylene bottle at room temperature for one month [2].

(c) Working standard solutions of 0.5, 1.0, 2.5, and 5.0 μmoles/l should be prepared each time an analysis is performed [2].

Note: Dilute aqueous lead standards remain stable for less than three hours. Lead is readily adsorbed on the surfaces of glass and plastic containers and this reaction is accelerated by exposure to light, particularly ultraviolet light [3]. It is recommended that very dilute aqueous lead solutions be prepared in a darkened room and protected from light [4].

This Standard Reference Material should be stored in the tightly-closed original bottle under normal laboratory conditions. Tests show the material to be dry as received and not to adsorb appreciable water when exposed to a 90 percent relative humidity atmosphere for 5 days.

The solutions of SRM 928 are stable as described above. At time of use these solutions should be clear and display no turbidity.

References:

[1] E. J. Catanzaro, T. J. Murphy, W. R. Shields and E. L. Garner, J. Res. NBS 72A, 261-267 (1968).

[2] L. Kopito and H. Shwachman, Measurement of lead in blood, urine, and hair by atomic absorption spectroscopy, Standard Methods of Clinical Chemistry, Vol. 7, G. R. Cooper, editor-in-chief, pp. 151-162, Academic Press, Inc., New York, N.Y. 1972.

[3] L. Kopito and H. Schwachman, J. Lab. Clin. Med. 70, 326-332 (1967).

[4] Fundamentals of Clinical Chemistry, N. W. Tietz, editor, pp. 852-857, W. B. Saunders Co., Philadelphia, Pa. (1970).

The date of issuance and certification of this Standard Reference Material was June 15, 1975.