National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 187c

Sodium Tetraborate Decahydrate (Borax)

pH Standard

This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. SRM 187c, Borax ($Na_2B_4O_7 \bullet 10H_2O$), meets the specifications of the American Chemical Society for reagent grade material. The water content of this salt, stored under ordinary conditions, is less than theoretical. This does not affect the use of this pH standard, but could lead to erroneous results if the partially desiccated salt is used as a boron or acidimetric standard. SRM 187c is provided in a unit of 30 g.

The pH(S) values listed below correspond to log $(1/\alpha_H)$, where α_H is a conventional activity of the hydrogen (hydronium) ion referred to the standard state ($p^\circ = 1 \times 10^5$ Pa) on the scale of molality. The values were derived from emf measurements of cells without liquid junction by the method of calculation described in Reference. [1] The uncertainty of the pH(S) of SRM 187c is estimated not to exceed $\pm$ 0.005 unit from 0 to 50 °C.

The 0.01-molal solution is recommended for the calibration of pH equipment. The pH(S) of this solution as a function of temperature is as follows:

°C	pH(S)	°C	pH(S)	°C	pH(S)
0.0	9.463	20.0	9.226	40.0	9.070
5.0	9.395	25.0	9.180	45.0	9.042
10.0	9.333	30.0	9.139	50.0	9.018
15.0	9.277	35.0	9.102		

These certified values apply only to SRM 187c.

Source of Material: The borax was obtained from J.T. Baker Co.

Expiration of Certification: This certification is valid for five years from date of shipment from NIST.

The experimental work leading to the certification of this material was carried out by W.F. Koch and Yung-Chi Wu of the Inorganic Analytical Research Division.

The technical and support aspects involved in the original preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by W.P. Reed. Revision of this certificate was coordinated through the Standard Reference Materials Program by J.C. Colbert.

Drying Instructions: The salt must <u>not</u> be dried in an oven before use.

Gaithersburg, MD 20899
May 24, 1993
(Revision of certificate dated 3-22-84)

Thomas E. Gills, Acting Chief
Standard Reference Materials Program

over)

Directions for Use: Preparation of the 0.01-molal solution: Crush gently any large lumps of salt. Transfer 3.81 g of the borax to a flask and dissolve in 1.000 kg of distilled carbon dioxide-free water. Alternatively, if volumetric apparatus is to be used, transfer 3.80 g to a 1-L volumetric flask, dissolve in distilled carbon dioxide-free water, and fill to the mark with water at 25 °C. Water, sufficiently carbon dioxide-free, can be prepared by boiling for 10 min and cooling in a vessel guarded by a soda-lime tube. The water should have a conductivity no greater than 2×10^{-6} siemens/cm. To avoid contamination of the buffer solution with atmospheric carbon dioxide, keep the stopper in place except when removing a portion of the solution. If desired, the solution may be protected with a soda-lime tube.

Stability of Prepared Solution: Solutions are stable for one month. For the highest accuracy, prepare fresh solutions on a weekly basis.

REFERENCE

[1] Bates, Roger, J. Res. Nat'l Bur. Stand., **66A**, 179 (1962).