

# Certificate

## Standard Reference Material 187b

### Sodium Tetraborate Decahydrate

#### (Borax)

This standard reference material is intended for use in defining the pH(S) scale. This lot of borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) was prepared to ensure high purity and uniformity. It 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 salt as a pH standard, but could lead to erroneous results were the partially desiccated salt used as a boron or acidimetric standard.

The pH(S) values listed below correspond to  $\log(1/a_{\text{H}})$ , where  $a_{\text{H}}$  is a *conventional* activity of the hydrogen (hydronium) ion referred to the standard state on the scale of molality. The values were derived from emf measurements of cells without liquid junction by the method of calculation described in the Journal of Research of the National Bureau of Standards, 66A, 179 (1962). The uncertainty of the pH(S) of Standard Reference Material 187b 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	9.460	20	9.227	37	9.093
5	9.392	25	9.183	40	9.074
10	9.331	30	9.143	45	9.044
15	9.276	35	9.107	50	9.017

The borax was obtained from the J. T. Baker Chemical Company of Phillipsburg, N. J. The experimental work leading to the certification of this material was carried out by B. R. Staples.

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of R. A. Durst.

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 T. W. Mears.

Washington, D. C. 20234  
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J. Paul Cali, Acting Chief  
Office of Standard Reference Materials

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### Directions for Use

Preparation of the 0.01-molal solution: Crush gently any large lumps of salt (the salt must not be dried in an oven before use). Transfer 3.80 g to a 1-liter 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 conductance less than  $2 \times 10^{-6} \text{ ohm}^{-1} \text{ cm}^{-1}$ . 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.