

# National Bureau of Standards

## Certificate

### Standard Reference Material 185f

#### Potassium Hydrogen Phthalate

#### pH Standard

This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. SRM 185f, Potassium Hydrogen Phthalate ( $\text{KHC}_8\text{H}_4\text{O}_4$ ), was prepared to insure high purity and uniformity.

The pH value of the standard pH(S), corresponds 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 molal scale. The certified values listed below 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 SRM 185f is estimated not to exceed  $\pm 0.005$  unit for the temperature range 0 to 50 °C.

The 0.05-molal solution is recommended for the standardization of pH equipment. The pH(S) of this solution as a function of temperature is given below: These certified values apply only to SRM 185f.

<u>°C</u>	<u>pH(S)</u>	<u>°C</u>	<u>pH(S)</u>
0.0	4.006	30.0	4.012
5.0	4.001	35.0	4.021
10.0	3.999	37.0	4.025
15.0	3.999	40.0	4.031
20.0	4.001	45.0	4.043
25.0	4.006	50.0	4.057

The values of pH(S) of SRM 185f were not measured above 50 °C. For pH(S) values for the temperature range 55-95 °C for potassium hydrogen phthalate, refer to National Bureau of Standards Special Publication 260-53, "Standardization of pH Measurements," December 1975, pp 25-26. (The estimated uncertainty of these values as applied to SRM 185f is  $\pm 0.01$  unit for the temperature range 55-95 °C.)

The potassium hydrogen phthalate was obtained from Mallinkrodt, Inc. It meets the specifications of the American Chemical Society for reagent-grade material, but may not be entirely free of impurities such as traces of occluded water, free acid or alkali, chlorides, sulfur compounds, or heavy metals.

The analytical measurements were performed by Yung-Chi Wu and William F. Koch of the Inorganic Analytical Research Division.

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of E.L. Garner, Chief, 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 W.P. Reed.

#### Directions for Use

Preparation of the 0.05-molal solution: The salt should be dried for 2 hours at 110 °C before use. Add 10.21g of SRM 185f to 1000.0g of distilled water and mix thoroughly. The distilled water should have a conductivity not greater than  $2 \times 10^{-6}$  siemens/cm. If volumetric apparatus is to be used, transfer 10.12g of SRM 185f to a 1-liter volumetric flask. Add distilled water to dissolve the salt, fill to the mark with distilled water at 25 °C, and mix thoroughly by shaking.

The water used in the preparation of this pH buffer solution need not be protected from atmospheric carbon dioxide, and elaborate precautions for the exclusion of air from the solution are not necessary. The solution should, however, be protected against evaporation and contamination by molds. This buffer solution should be replaced, at least every month or whenever mold is detected, if the highest accuracy is required.