



National Institute of Standards & Technology

Certificate

Standard Reference Material 185g

Potassium Hydrogen Phthalate

pH Standard

This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating pH measuring systems. SRM 185g, Potassium Hydrogen Phthalate ($\text{KHC}_8\text{H}_4\text{O}_4$), was prepared to ensure high purity and uniformity. However, this SRM is certified only with respect to pH(S) values, not as a pure substance.

The certified pH(S) values listed below were derived from emf measurements of cells without liquid junction using hydrogen gas and AgCl/Ag electrodes (where the hydrogen gas was at 1 atmosphere) by the method described in reference [1]. The pH(S) value corresponds to $\log(1/a_{\text{H}})$ where a_{H} is the conventional activity of the hydrogen ion referred to the standard state on the molal scale. The uncertainty of the assigned values of pH(S) is estimated not to exceed ± 0.005 unit for the temperature range 0 to 50 °C.

The 0.05-molal solution is recommended for the standardization of pH measuring systems. The certified pH(S) values of this solution as a function of temperature are given below. These values apply only to this SRM lot.

°C	pH(S)	°C	pH(S)
0.0	4.005	30.0	4.010
5.0	4.003	35.0	4.020
10.0	4.001	37.0	4.025
15.0	4.002	40.0	4.033
20.0	4.003	45.0	4.047
25.0	4.005	50.0	4.061

The values of pH(S) of SRM 185g are not certified above 50 °C. For pH(S) values for the temperature range 55-95 °C for potassium hydrogen phthalate, refer to reference [2] for more details. The estimated uncertainty of values for the temperature range 55-95 °C is ± 0.01 .

The potassium hydrogen phthalate was obtained from Aldrich Chemical Co. It meets the specifications of the American Chemical Society for a primary standard, but may not be entirely free of impurities such as traces of occluded water, free acid or alkali, chlorides, sulfur compounds, or heavy metals.

Stability

SRM 185g is stable when stored in its original container, with the cap tightly closed under normal laboratory conditions of temperature and humidity.

The certification measurements were performed by Yung-Chi Wu and Daming Feng of the Inorganic Analytical Research Division. Corroborating measurements were made by Hans Bjarne Kristensen at Radiometer A/S, Copenhagen, Denmark. Statistical consultation was provided by K. Eberhardt of the Statistical Engineering Division.

Gaithersburg, MD 20899
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(Revision of certificate dated 1-31-84)

William P. Reed, Acting Chief
Standard Reference Materials Program

(over)

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of W. F. Koch, Deputy 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 Standard Reference Materials Program by J. C. Colbert.

Directions for Use

Preparation of the 0.05-molal solution:

The SRM should be dried for 2 hours at 110 °C before use. Add 10.21 g of the dried SRM to 1000.0 g of distilled water and mix thoroughly. The distilled water should have an electrolytic conductivity not greater than 2 microsiemens/cm. If volumetric apparatus is to be used, transfer 10.12 g of the SRM to a 1-liter volumetric flask. Add distilled water to dissolve salt, fill to the mark with distilled water at 25 °C, and mix thoroughly by shaking. (The values given are weights in air.)

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.

References

[1] Wu, Y.C., Koch, W.F. and Marinenko, G., J. Res. Nat'l Bur. Stand. **89**, 395 (1984).

[2] Wu, Y.C., Koch, W.F. and Durst, R.A., Standard Reference Materials: Standardization for pH Measurements, NBS Spec. Publ. 260-53 (February 1988).