

National Bureau of Standards

Certificate

Standard Reference Material 2185

Potassium Hydrogen Phthalate

pD Standard

This Standard Reference Material (SRM) is intended for use in preparing buffer solutions to calibrate electrodes for pD measuring systems. SRM 2185, Potassium Hydrogen Phthalate ($\text{KHC}_8\text{H}_4\text{O}_4$), was prepared to ensure high-purity and uniformity. It meets the specifications of the American Chemical Society for reagent-grade material; however, it should not be considered to be entirely free of impurities such as traces of occluded water, free acid or alkali, chlorides, sulfur compounds, or heavy metals.

pD(S) Values

The certified pD(S) values listed below correspond to $\log(I/a_D)$, where a_D is a conventional activity of the deuterium ion referred to the standard state on the molal scale. The certified values were derived from emf measurements of cells without liquid junction by the method of calculation similar to that described in the Journal of Research of the National Bureau of Standards, 66A, 179 (1962). The uncertainty of the certified values of pD(S) is estimated not to exceed ± 0.005 unit from 5 to 50 °C. This uncertainty includes allowances for random error and all known sources of possible systematic error.

A 0.05-molal solution is recommended for the calibration of the glass electrode and pH meter used for pD measurement. The pD(S) of this solution as a function of temperature is given below:

°C	pD(S)	°C	pD(S)
5.0	4.542	30.0	4.518
10.0	4.532	35.0	4.521
15.0	4.524	40.0	4.527
20.0	4.520	45.0	4.534
25.0	4.518	50.0	4.543

The potassium hydrogen phthalate was obtained from Mallinckrodt, Inc., St. Louis, Mo.

The analytical measurements leading to the certification of the material were performed by Y.C. Wu and W.F. Koch, NBS Inorganic Analytical Research Division.

The overall direction and coordination of technical measurements leading to certification were performed under the chairmanship of J.R. DeVoe, Chief, NBS 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 and L.J. Powell.

Gaithersburg, MD 20899
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Stanley D. Rasberry, Chief
Office of Standard Reference Materials

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Directions for Use

Preparation of the 0.05-molal solution: SRM 2185 should be dried for 2 hours at 110 °C before use. Add 10.218 g of the dried SRM to 1000.0 g of deuterium oxide (weights in air) and mix thoroughly. If volumetric apparatus is to be used, transfer 11.237 g of the dried SRM (weight in air) to a 1-liter volumetric flask. Dissolve and fill to the mark with deuterium oxide at 25 °C. Mix thoroughly by shaking. The deuterium oxide should have an isotopic composition of at least 99 mole percent D₂O and should have a conductivity no greater than 2×10^{-6} siemens/cm.

The buffer solution should be protected from air during storage and all transfers of the D₂O solution should be done in an inert atmosphere to avoid rapid isotope exchange. If the calibration process is completed within one hour, it is not necessary to exclude air from the working solution. The buffer solution should be discarded after a few weeks, or sooner, if mold is detected or if it has been exposed repeatedly to air.