U. S. Department of Commerce
Malcolm Baldrige
Secretary
National Bureau of Standards
Ernest Ambler, Director

National Bureau of Standards

Certificate

Standard Reference Material 188

Potassium Hydrogen Tartrate
(pH Standard)

This Standard Reference Material (SRM) is intended for use in preparing solutions for calibrating electrodes for pH measuring systems. SRM 188, potassium hydrogen tartrate ($KHC_4H_4O_6$), is a material of high purity and uniformity; however, it should not be considered entirely free from impurities such as traces of free acid or alkali, occluded water, chlorides, sulfur compounds, and heavy metals.

The certified values listed in the table below are the assigned pH(S) numbers for solutions of Standard Reference Material 188 as functions of temperature. These values correspond to log ($1/a_H$), where a_H is the conventional activity of the hydrogen ion referred to the standard state on the scale of molality. They 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 in the pH(S) values listed is estimated not to exceed ±0.005 unit from 0 to 60 °C and ±0.01 unit from 70 to 95 °C. The certified values apply only to SRM 188.

A solution saturated with potassium hydrogen tartrate at 25 °C ± 1 °C is recommended as a standard for the calibration of pH equipment between 25 and 95 °C.

Table 1

°C	pH(S)	°C	pH(S)	°C	pH(S)
25	3.557	45	3.547	70	3.580
30	3.552	50	3.549	80	3.609
35	3.549	55	3.554	90	3.650
38	3.548	60	3.560	95	3.674
40	3.547				

The 0.01 molal solution is recommended as a standard for the range 0 to 60 °C.

Table 2

°C	pH(S)	°C	pH(S)	°C	pH(S)
0	3.711	20	3.647	40	3.632
5	3.689	25	3.639	45	3.635
10	3.671	30	3.635	50	3.639
15	3.657	35	3.632	55	3.644
		38	3.631	60	3.651

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Stanley D. Rasberry, Chief
Office of Standard Reference Materials

Directions for Use

Preparation of the saturated solution: Add an excess of undried SRM 188 to distilled water in a glass-stoppered bottle or flask and shake vigorously. With 100 percent excess of the salt, a few minutes of shaking is sufficient for saturation. (Note: 100 mL of water at 25 °C will dissolve about 0.7 g of potassium hydrogen tartrate.) Allow the solid to settle and decant the clear solution, or filter if necessary. Store the solution in a glass-stoppered borosilicate glass bottle.

Preparation of the 0.01 -molal solution: Add 1.883 g (air weight) of undried SRM 188 to 1000.0 g of distilled water and mix thoroughly. If volumetric apparatus is to be used, transfer 1.878 g (air weight) of Standard Reference Material 188 to a 1-liter volumetric flask. Fill to the mark with distilled water and shake until all of the salt is dissolved and the solution thoroughly mixed.

Solutions of tartrate are very susceptible to mold growth, which is usually accompanied by an increase of a few hundredths in pH. For accurate results, tartrate standards should be prepared fresh each day. The distilled water used in preparation of these solutions should have a conductivity not greater than 2×10^{-6} ohm^{-1} cm^{-1} at 25 °C, but dissolved carbon dioxide need not be removed.