

U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS

CERTIFICATE  
FOR

STANDARD SAMPLE 186

POTASSIUM DIHYDROGEN PHOSPHATE (186-I)-  
DISODIUM HYDROGEN PHOSPHATE (186-II)

(pH standard)

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PURITY

These lots of potassium dihydrogen phosphate ( $\text{KH}_2\text{PO}_4$ ) and disodium hydrogen phosphate ( $\text{Na}_2\text{HPO}_4$ ) were prepared to insure high purity and uniformity. They meet the specifications of the American Chemical Society for reagent-grade materials, but should not be considered as entirely free from impurities such as traces of water, free acid or alkali, carbon dioxide, chlorides, sulfur compounds, and heavy metals.

pH VALUES

The two phosphates are to be used together in equal-molar proportions as described below for the preparation of buffer solutions because neither when used alone is sufficiently well buffered to provide a solution whose pH value is stable. The pH values at 25° C for various concentrations of the equal-molar phosphate buffer are as follows:

Molarity	pH	Molarity	pH
0.005	7.018	0.025	6.860
.01	6.959	.05	6.772
.02	6.886		

The 0.025 molar solution is recommended for the calibration of pH equipment. The pH of this solution as a function of temperature is given below:

°C	pH	°C	pH	°C	pH
0	6.983	25	6.860	50	6.833
5	6.950	30	6.849	55	6.836
10	6.922	35	6.842	60	6.840
15	6.896	40	6.837		
20	6.878	45	6.834		

An uncertainty of  $\pm 0.003$  pH unit is estimated. The pH values were derived from emf measurements of cells without liquid junctions, and equations and values for the natural constants accepted by the National Bureau of Standards.

#### DIRECTIONS FOR USE

Preparation of a 0.025-molar solution: Transfer 3.402 g of the potassium dihydrogen phosphate (186-I) and 3.549 g of the disodium hydrogen phosphate (186-II) to a 1-liter volumetric flask, dissolve and fill to the mark with distilled water having a pH of not less than 6.5 nor more than 7.5. Water of this quality can be obtained by boiling distilled water for 15 minutes and cooling it under carbon-dioxide-free conditions. For work within 0.01 pH unit, distilled water of ordinary grade (pH 5.6 to 8.0) may be used. The salts should be dried for 2 hours at 130° C before use. No special precautions to prevent contamination of the buffer solution with atmospheric carbon dioxide are necessary. The 0.025-M solution prepared on the volume (molar) basis has a pH value within 0.001 unit of that prepared on the weight (molal) basis.

(Signed) E. U. CONDON, Director.  
G.E.F.L.

November 13, 1945.