

U. S. DEPARTMENT OF COMMERCE  
NATIONAL BUREAU OF STANDARDS  
WASHINGTON 25, D. C.

# National Bureau of Standards Certificate

Standard Sample 185c

## Potassium Hydrogen Phthalate

*p*H Standard

### PURITY

This lot of acid potassium phthalate (HKC<sub>8</sub>H<sub>4</sub>O<sub>4</sub>) was prepared to insure high purity and uniformity. It meets the specifications of the American Chemical Society for reagent-grade material, but should not be considered as entirely free from impurities such as traces of occluded water, free acid or alkali, chlorides, sulfur compounds, and heavy metals.

### *p*H VALUES

The *p*H values of aqueous solutions of Standard 185c at 25° C are as follows:

Molarity	<i>p</i> H	Molarity	<i>p</i> H
0.005	4.17	0.05	4.01
.01	4.12	.1	3.95

The 0.05-molar solution is recommended for the standardization of *p*H equipment. The *p*H of this solution as a function of temperature is given below:

°C	<i>p</i> H	°C	<i>p</i> H	°C	<i>p</i> H	°C	<i>p</i> H
0	4.01	25	4.01	50	4.06	80	4.16
5	4.01	30	4.01	55	4.07	90	4.20
10	4.00	35	4.02	60	4.09	95	4.23
15	4.00	40	4.03	70	4.12		
20	4.00	45	4.04				

The *p*H values are recorded to the nearest 0.01 unit. They were derived from emf measurements of cells without liquid junction with equations and values for the natural constants accepted by the National Bureau of Standards. The given values of *p*H correspond as closely as possible to  $\log (1/a_{\text{H}})$ , where  $a_{\text{H}}$  is a conventional activity of hydrogen (hydronium) ion referred to the standard state on the scale of molality.

### DIRECTIONS FOR USE

*Preparation of 0.05-molar solution:* Transfer 10.21 g of Standard 185c to a 1-liter volumetric flask, dissolve, and fill to the mark with distilled water having a *p*H not less than 6.5 and not more than 7.5. For an accuracy of  $\pm 0.01$  *p*H unit, it is unnecessary to dry the salt before use. Elaborate precautions for the exclusion of atmospheric carbon dioxide are unnecessary, although the solution should be protected against evaporation and contamination with molds. The standard buffer solution should be replaced when mold is apparent.

A. V. ASTIN, *Director.*

WASHINGTON 25, D. C., October 1, 1958.

Until new standard sample certificates are issued, it is suggested that the values of  $pH_s$  given below be used. Details will appear in the Journal of Research NBS in the spring of 1962.

Recommended standard values of  $pH_s$

[Estimated uncertainty  $\pm 0.005$  ( $0^\circ$  to  $60^\circ$  C),  $\pm 0.008$  ( $60^\circ$  to  $90^\circ$  C): m=molality]

t	Tetroxalate 0.05 m	Tartrate (Satd. at $25^\circ$ C)	Phthalate 0.05 m	<sup>a</sup> Phosphate 0.025 m	<sup>b</sup> Phosphate (blood std.)	Borax 0.01 m	Calcium Hydroxide (Satd. at $25^\circ$ C)
$^\circ$ C							
0	1.666	-	4.003	6.984	7.534	9.464	13.423
5	1.668	-	3.999	6.951	7.500	9.395	13.207
10	1.670	-	3.998	6.923	7.472	9.332	13.003
15	1.672	-	3.999	6.900	7.448	9.276	12.810
20	1.675	-	4.002	6.881	7.429	9.225	12.627
25	1.679	3.557	4.008	6.865	7.413	9.180	12.454
30	1.683	3.552	4.015	6.853	7.400	9.139	12.289
35	1.688	3.549	4.024	6.844	7.389	9.102	12.133
38	1.691	3.548	4.030	6.840	7.384	9.081	12.043
40	1.694	3.547	4.035	6.838	7.380	9.068	11.984
45	1.700	3.547	4.047	6.834	7.373	9.038	11.841
50	1.707	3.549	4.060	6.833	7.367	9.011	11.705
55	1.715	3.554	4.075	6.834	-	8.985	11.574
60	1.723	3.560	4.091	6.836	-	8.962	11.449
70	1.743	3.580	4.126	6.845	-	8.921	-
80	1.766	3.609	4.164	6.859	-	8.885	-
90	1.792	3.650	4.205	6.877	-	8.850	-
95	1.806	3.674	4.227	6.886	-	8.833	-

<sup>a</sup>0.025 m  $KH_2PO_4$ , 0.025 m  $Na_2HPO_4$   
<sup>b</sup>0.008695 m  $KH_2PO_4$ , 0.03043 m  $Na_2HPO_4$