

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
WASHINGTON, D.C. 20234

National Bureau of Standards
Certificate

Standard Sample 189

Potassium Tetroxalate
($p a_{\text{H}}$ Standard)

Purity

This lot of potassium tetroxalate dihydrate ($\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 2 \text{H}_2\text{O}$) was prepared to insure high purity and uniformity and to assay close to 100 percent. However, it is certified only with respect to its $p a_{\text{H}}$ value, not as a pure substance.

$p a_{\text{H}}$ Values

The values listed in this certificate are the conventional $p a_{\text{H}}$ numbers for solutions of Standard Sample 189. The values given correspond to $\log (1/a_{\text{H}})$, where a_{H} is a *conventional* activity of the hydrogen (hydronium) 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 is estimated not to exceed ± 0.005 unit from 0 to 60 °C and ± 0.01 unit from 60 to 95 °C.

The liquid-junction potential of the common pH cell displays a considerably greater variability in solutions of pH less than 2.5 than in solutions of pH between 2.5 and 11.5. For this reason, solutions of potassium tetroxalate are not recommended as primary standards of pH. They are useful, however, as secondary standards and for confirmatory purposes, with the expectation that the experimental pH may differ by 0.02 to 0.05 unit from the values of $p a_{\text{H}}$ given above. They are also recommended when standards of $p a_{\text{H}}$ are needed and a liquid junction is not involved.

The 0.05-*m* solution is recommended for use as a standard for $p a_{\text{H}}$. The $p a_{\text{H}}$ values of this solution are given in the following table:

°C	$p a_{\text{H}}$	°C	$p a_{\text{H}}$	°C	$p a_{\text{H}}$
0	1.666	30	1.683	55	1.715
5	1.668	35	1.688	60	1.723
10	1.670	38	1.691	70	1.743
15	1.672	40	1.694	80	1.766
20	1.675	45	1.700	90	1.792
25	1.679	50	1.707	95	1.806

Directions for Use

Preparation of the 0.05-molal solution: Transfer 12.61 g (air weight) to a 1-liter volumetric flask. Dissolve the salt and fill to the mark with distilled water at 25 °C. It is not necessary to remove dissolved atmospheric carbon dioxide from the water and the salt should not be dried.

WASHINGTON, D.C. 20234
January 10, 1964

A. V. ASTIN, *Director*