



Certificate of Analysis

Standard Reference Materials

Sodium Bicarbonate (191)

Sodium Carbonate (192)

PURITY

These lots of sodium bicarbonate (NaHCO_3) and sodium carbonate (Na_2CO_3) 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 alkali, silica, chlorides, sulfur compounds and heavy metals.

pH(S) Values

The pH(S) values listed below 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. The values were derived from the emf 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 of the assigned values of pH(S) is estimated not to exceed ± 0.005 unit from 0 to 50 °C. The values listed below apply only to the lots here certified. Minor variations of pH(S) (of the order of a few thousandths of a unit) may be expected to occur between different lots.

The solution 0.025 molal with respect to both NaHCO_3 and Na_2CO_3 is recommended for the calibration of pH equipment. The pH(S) of this solution as a function of temperature is given below:

°C	pH(S)	°C	pH(S)	°C	pH(S)
0	10.321	20	10.064	40	9.891
5	10.248	25	10.014	45	9.859
10	10.181	30	9.968	50	9.831
15	10.120	35	9.928		

The sodium bicarbonate and sodium carbonate were obtained from the Mallinckrodt Chemical Works of St. Louis, Mo. The experimental work leading to the certification of this material was carried out by Bert R. Staples and Roger G. Bates.

The overall direction and coordination of technical measurements leading to the certification were performed under the chairmanship of Roger G. Bates.

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 Thomas W. Mears.

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W. Wayne Meinke, Chief
Office of Standard Reference Materials

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Directions for Use

Preparation of the 0.025-molal solution. Transfer 2.092 g of sodium bicarbonate (191) and 2.640 g of Na_2CO_3 (192)(weights in air) to a 1-liter volumetric flask. Dissolve and fill to the mark with distilled water at 25 °C. The distilled water should contain no dissolved carbon dioxide and should have a conductivity no greater than $2 \times 10^{-6} \Omega^{-1} \text{ cm}^{-1}$. Carbon dioxide free water can be prepared by boiling a good grade of distilled water for 10 min. and guarding it with a soda lime tube while cooling. The sodium bicarbonate should not be dried by heating; the sodium carbonate should be dried for 2 hr. at 275 °C before use. Although elaborate precautions to prevent contamination of the buffer solution with atmospheric carbon dioxide are usually unnecessary, the container should be kept tightly stoppered at all times when a sample is not actually being removed.