

Sodium Metaborate 4 Mol

$\text{NaBO}_2 \cdot 2\text{H}_2\text{O}$ [or $\text{Na}_2\text{B}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$]
Sodium Metaborate Dihydrate
Technical Grade: Granular

CAS Number 16800-11-6

Sodium metaborate 4 mol, an alkaline salt with excellent buffering properties, consists of white crystalline granules. The high solubility of sodium metaborate 4 mol can provide a much higher concentration of borate ions in solution than *Neobor*® borax 5 mol or borax at the same temperature.

Applications and benefits

Photochemicals

Sodium metaborate 4 mol is used as a component of photographic developers and replenishers. Its principal function as a buffering agent is to control the pH within close limits. This is essential both in fine grain black-and-white developers and in ensuring the correct color balance in color developers.

Adhesives

The specific effect of sodium metaborate 4 mol in the preparation of starch and dextrin adhesives is due to the high degree of alkalinity and the crosslinking reaction of borate anions with polyhydroxy groups. The interchain linkages produce an adhesive with increased viscosity, quicker tack and better fluidity properties. These qualities are essential for use in corrugated boxes, paper bags, laminated paper boards, carton/case sealing, gummed tape, and tube winding.

Textile processing

Textiles such as cotton are bleached with hydrogen peroxide solutions which can be stabilized by sodium metaborate. In addition, sodium metaborate neutralizes the acidic oxidation products formed during bleaching. Textile sizing can be controlled by incorporation of the adhesive material within the thread and by binding all the fibers together to increase the tensile strength of the thread. Sodium metaborate is added to the starch adhesives to accomplish these functions.

Detergents and cleaners

Sodium metaborate 4 mol is used in hard surface cleaners to remove oil, grease, rust, scale and other particulates from metal or glass surfaces. The cleaning action is enhanced by the alkaline conditions imparted by sodium metaborate. Sodium metaborate can also be incorporated in liquid laundry detergents for pH control, enzyme stabilization, and its builder properties.

Corrosion inhibition

Sodium metaborate 4 mol is incorporated in many proprietary water treatment chemicals requiring pH control and corrosion inhibition. They are used for protecting central heating systems and cooling towers against corrosion.

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Chemical and physical properties

Theoretical composition	
Boric oxide, B ₂ O ₃	34.18%
Sodium oxide, Na ₂ O	30.43%
Water of crystallization, H ₂ O	35.39%
Anhydrous equivalent, NaBO ₂	64.62%

Characteristics	
Molecular weight NaBO ₂ ·4H ₂ O	101.83
Specific gravity	1.90

Stability

Sodium metaborate 4 mol is stable at ordinary temperatures. If exposed to the atmosphere for extended periods, it will pick up carbon dioxide from the air and form sodium carbonate and borax. Sodium metaborate 4 mol shows little tendency to cake except after prolonged storage or if it becomes severely wetted by rain or substantial water penetration. When stored under normal conditions of temperature and humidity, sodium metaborate 4 mol is unlikely to cake or change chemically. It is, of course, essential to maintain the integrity of the packaging.

Melting point

The crystalline salt begins to dissolve in its own water at about 90°C (194°F). The anhydrous salt fuses to a clear glass at 966°C (1770°F). Some vaporization occurs above 1230°C (2246°F).

Hydrogen ion concentration

Aqueous solutions of sodium metaborate 4 mol show a moderate increase in pH with increasing concentration:

Sodium metaborate 4 mol (wt)	pH @ 20°C (68°F)
0.1%	10.6
0.5%	10.9
1.0%	11.1
2.0%	11.3
4.0%	11.5
6.0%	11.6
8.0%	11.8
10.0%	11.8
15.0%	12.0
18.0%	12.2

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Solubility in water, as $\text{NaBO}_2 \cdot 2\text{H}_2\text{O}$ [or $\text{Na}_2\text{B}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$]	
Temp °C (°F)	% by weight
0 (32)	22.4
5 (41)	24.3
10 (50)	26.3
15 (59)	28.6
20 (68)	31.0
25 (77)	33.4
30 (86)	36.5
35 (95)	39.6
40 (104)	43.2
45 (113)	47.7
50 (122)	52.8
53.6* (128.6)	57.1
55 (131)	57.6
60 (140)	59.3
65 (149)	61.1
70 (158)	63.3
75 (167)	65.3
80 (176)	67.6
85 (185)	70.3
90 (194)	73.4
95 (203)	76.8
100 (212)	81.1

* Exists as sodium metaborate 8 mol below 53.6°C; transition to sodium metaborate 4 mol, which is stable, from 53.6°C to 105°C.

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