



Neobor®



Sodium Tetraborate Pentahydrate

Borax 5 Mol

Neobor Pentahydrate Borax

Technical Grade: Granular and Powder

CAS Number 12179-04-3

TSCA Number 1330-43-4

Neobor® is the most common form of sodium borate used in industry. Consisting of white crystalline granules or powder it is mildly alkaline in solution. The advantages of *Neobor* compared with borax lie in the lower transportation, handling and storage costs of a more concentrated product. *Neobor* is stable under ordinary conditions, free-flowing, and easily handled by air or mechanical conveying.

Applications and benefits

Glass type	Thermal Expansion	Melting Temperature	Melting Rate	Glass Viscosity	Surface Tension	Chemical Resistance
Insulation Fiber Glass (Glass Wool)		X	X	X	X	X
Textile Fiber Glass (E Glass)		X	X	X	X	X
Borosilicate Glass	X	X	X	X		X
Glazes and Enamels	X	X	X	X	X	X

Glasses and fiber glass

Neobor serves as a source of boric oxide (B_2O_3) in many compositions, including insulation fiber glass, textile fiber glass and borosilicate glasses (heat resistant, illumination, cookware, medical/cosmetic containers, hollow/solid microspheres, optical lenses and sealing glass). It also provides a source of sodium, and is used in combination with boric acid where it is necessary to control the sodium to boron ratio in the glass.

The function of B_2O_3 in glass making is that of both flux and network former. It controls the melt and influences the final product properties.

In fiber glass, B_2O_3 assists “fiberizing” and gives durability in use while decreasing thermal emissivity. In borosilicate glasses, it gives a low coefficient of thermal expansion (thus providing resistance to heat and thermal shock), and improves chemical durability.

Glazes and enamels

Neobor increases the strength, scratch resistance, and chemical resistance of ceramic wares such as wall and floor tiles, tableware and porcelain, and of enamelled appliances. By controlling the coefficient of expansion, B_2O_3 facilitates thermal fit between glaze and body; it also reduces melting temperatures, inhibits devitrification, and provides for a smooth, even finish.

Detergents and bleach

Neobor is used in the manufacture of sodium perborate, a bleaching agent in laundry powders. It also acts as a water softener and pH buffer, in the wash solution, and assists in soil removal. In liquid detergents, it stabilizes enzymes.

Cleaning products

Neobor is incorporated in many cleaning products as a pH buffering agent, to aid in the emulsification of oils, and as a gentle abrasive. When combined with polyhydroxyl compounds, *Neobor* can be used for viscosity control. *Neobor* is added to formulations to clean hard surfaces such as metals, glass and toilet bowls. It is also used as an additive in hand cleaners, polishes and waxes and industrial/institutional cleaning compounds.

Flame retardancy

Borates change the oxidation reactions in the combustion of cellulosic materials to cause the formation of carbon residue. This char acts as a barrier to combustion and diverts the decomposition products that would otherwise smolder. *Neobor*, in combination with boric acid, is particularly effective in reducing the flammability of cellulosic materials.

Corrosion inhibition

Neobor is incorporated in many aqueous systems requiring corrosion inhibition. It protects ferrous metals against oxidation and finds use in the manufacture of automotive anti-freeze formulations, water treatment chemicals, and metal-working fluids.

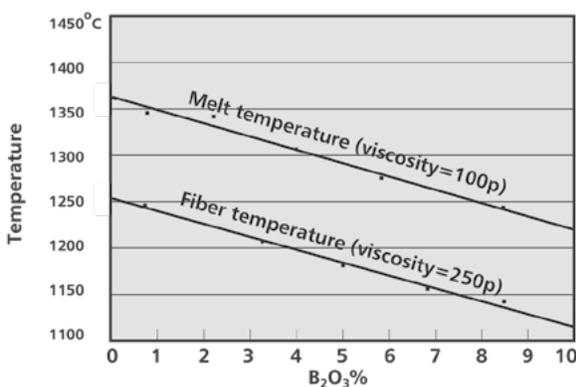
Adhesives

Neobor is part of the starch adhesive formulation for corrugated paper and paperboard, and is a peptizing agent in the manufacture of casein-based and dextrin-based adhesives. *Neobor* greatly improves the tack and green strength of the adhesive by crosslinking conjugated hydroxyl groups.

Some other applications

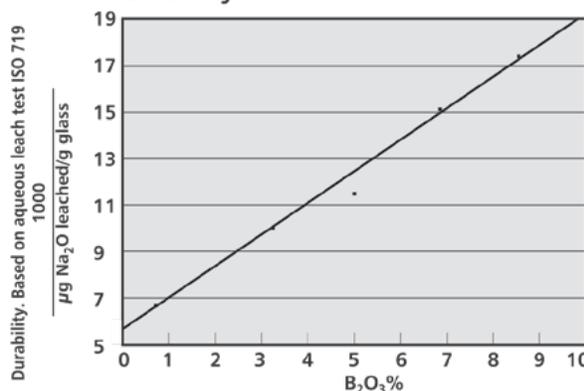
Neobor is used as a lubricant carrier in wire drawing; stabilizer and bonding agent in refractories, cover flux in metallurgy, set retardant in cements and concrete, pH buffer in aqueous solutions, and as a wax emulsifier.

Effect of B₂O₃ on insulation fiberglass manufacture



By reducing glass viscosity, the addition of B₂O₃ progressively lowers both the melting and fiberizing temperatures.

Effect of B₂O₃ on insulation fiberglass durability



By increasing aqueous durability, the addition of B₂O₃ improves insulation fiber glass resistance to atmospheric corrosion.

Chemical and physical properties

Stability

Neobor is a stable crystalline product which does not change chemically under normal storage conditions. If wetted it reacts exothermically with the water, forming borax decahydrate. Care should therefore be taken to prevent exposure of the product to moisture, and to avoid wide fluctuations in temperature and humidity during storage. This can also cause the product to cake. It is, of course, essential to maintain the integrity of the packaging.

Buffering action

Dissolved in water, *Neobor* hydrolyzes to give a mildly alkaline solution. It is thus capable of neutralizing acids. It also combines with strong alkalis to form compounds of lower pH. The relatively constant pH of *Neobor* solutions makes it an excellent buffering agent.

Solubility in water

Temperature °C (°F)	Neobor® % by weight in saturated solution
0 (32)	1.52
5 (41)	1.88
10 (50)	2.36
15 (59)	2.90
20 (68)	3.59
25 (77)	4.43
30 (86)	5.50
35 (95)	6.89
40 (104)	8.57
45 (113)	10.86
50 (122)	13.68
55 (131)	17.73
60 (140)	23.16
65 (149)	25.88
70 (158)	28.21
75 (167)	30.69
80 (176)	33.85
85 (185)	37.06
90 (194)	40.62
95 (203)	45.02
100 (212)	50.13

Solubility in other solvents

Organic solvent	Temp °C (°F)	Neobor® % by weight in saturated solution
Methanol	25 (77)	16.94
Propylene glycol	25 (77)	21.86
Ethylene glycol	25 (77)	31.12
Diethylene glycol	25 (77)	9.99

Theoretical chemical composition

% B ₂ O ₃	47.80
% Na ₂ O	21.28
% H ₂ O	30.92
Anhydrous equivalent Na ₂ B ₄ O ₇ %	69.08

Characteristics

Molecular Weight	291.30
Specific Gravity	1.88
Onset of Water Loss	88°C (190.4°F)
Heat of Solution (absorbed) 1 wt % at 35°C (95°F)	2.57 x10 ⁵ J/kg (110 BTU/lb)

Comparative pH of some common alkalis @ 20°C (68°F)

Weight%	0.1	0.5	1.0	2.0	5.0
Caustic soda	11.90	12.70	13.10	13.30	13.80
Sodium metasilicate	11.30	12.10	12.30	12.70	13.10
Trisodium phosphate	11.50	11.55	11.60	11.70	11.80
Soda ash	10.70	11.30	11.40	11.50	11.60
Neobor®	9.25	9.22	9.23	9.25	(9.32*)

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