

Borax Decahydrate



Sodium Tetraborate Decahydrate

Disodium Tetraborate Decahydrate

Borax 10 Mol

Technical Grade: Granular and Powder

Technical Grade: 30/70 mesh and 40/200 mesh

Special Quality (SQ): Granular

CAS Number 1303-96-4

Borax decahydrate is the refined form of natural sodium borate. Composed of boric oxide (B_2O_3), sodium oxide, and water, it is a mild, alkaline salt, white and crystalline, with excellent buffering and fluxing properties. Available in powder or granular form, borax decahydrate is an important multi-functional source of B_2O_3 , particularly for processes in which the simultaneous presence of sodium is beneficial.

Applications and benefits

Soap and detergents

Borax decahydrate is incorporated in many cleaning products as a pH buffering agent, to aid in the emulsification of oils, and as a gentle abrasive. Borax decahydrate is added to powdered hand soaps to remove medium to heavy soils encountered in industrial operations. It is gentle to the skin, yet highly effective in removing dirt. Borax decahydrate is added to formulations to clean hard surfaces such as metals, glass, and ceramics. It is also used as an additive in hand cleaners, polishes and waxes, and industrial/institutional cleaning compounds. In laundry detergents, it facilitates the removal of oily soils from fabrics, and imparts alkalinity, pH buffering, and softening of the wash water. It is also used to stabilize enzymes.

Personal care products

Borax decahydrate is used in cosmetics, toiletries, and pharmaceuticals. In contact lens solutions, it is used in conjunction with boric acid as a gentle cleaner and buffering agent. Borax decahydrate is also used as a crosslinking agent to emulsify waxes and other paraffins used as a base for lotions, creams, and ointments.

Metallurgical fluxes

The ability of borax decahydrate to dissolve metal oxides is exploited in the recovery of metals such as brass, copper, lead, and zinc from scrap or smelting slag.

In ferrous metallurgy, borax decahydrate is used as a cover flux to prevent oxidation at the surface of the molten ingot. In welding, brazing, and soldering, borax decahydrate covers the metal surfaces, excluding air and preventing oxidation. It also acts as a solvent and cleaning agent.

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Corrosion inhibition

Borax decahydrate is incorporated in many aqueous systems requiring corrosion inhibition. It protects ferrous metals against oxidation and finds use in the manufacture of automotive and engine coolant formulations, and various water treatment chemicals.

The high solubility of borax decahydrate in ethylene glycol makes it especially useful in car antifreeze formulations. Borax decahydrate neutralizes the acidic residue resulting from the decomposition of ethylene glycol and minimizes the rate of oxidation at the surface of the metal. Aqueous solutions of borax decahydrate have replaced chromates in railroad and other diesel engine coolants.

Adhesives

Borax decahydrate 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. It greatly improves the tack and green strength of the adhesive by crosslinking conjugated hydroxyl groups.

Wire drawing

Borax decahydrate neutralizes the residual acid from the pickling stage, and the deposit of the salt remaining on the wire is valuable as a carrier of dry powdered lubricant.

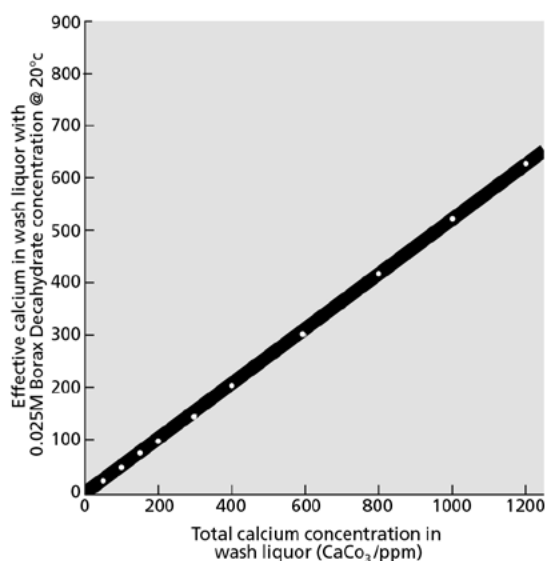
Refractories

Borax decahydrate compounds are used as stabilizers and bonding agents in specialty abrasives. Borax decahydrate gives an intermediate-temperature glassy bond prior to the establishment of the ceramic bond, at which point the borate compound is frequently volatilized from the system.

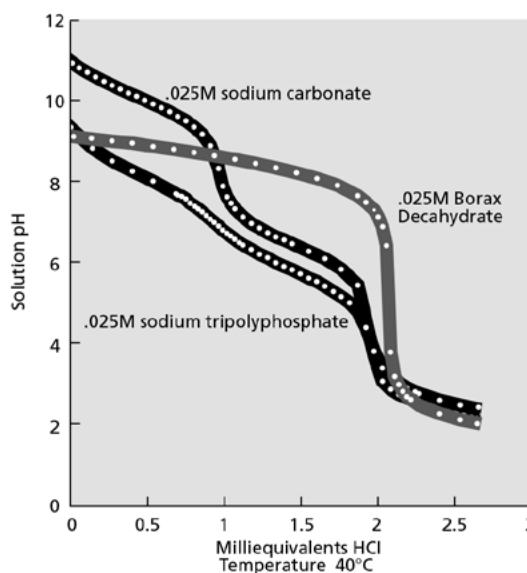
Some other applications

Borax decahydrate is used as a flame retardant for cellulosic materials, a buffer and catalyst for organic dyes, a carrier for herbicides, a coolant for diesel engines, and a degreasing buffer in enamelling processes.

Water softening (calcium ion sequestration) by borax decahydrate in detergents



Borax decahydrate maintains desired alkalinity in wash liquor by acting as pH buffer



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Chemical and physical properties

Stability

Borax decahydrate is chemically stable under normal storage conditions. Borax decahydrate has a slight water vapor pressure which increases with warmer temperatures. This can cause crystallization at particle contact points, resulting in caking. Borax decahydrate will slowly lose water of crystallization if exposed to a warm, dry atmosphere. Conversely exposure to a humid atmosphere causes caking. When storing the product, care should therefore be taken to avoid wide fluctuations in temperature and humidity, and to ensure that the packaging is not damaged.

Buffering action

Dissolved in water, borax decahydrate 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 borax decahydrate solutions makes it an excellent buffering agent.

| Characteristics | |
|---|---|
| Molecular weight | 381.37 |
| Specific gravity | 1.71 |
| Onset of water loss | 62°C (144°F) (enclosed space) |
| Heat of solution (absorbed) 1% @ 32°C (90°F) | 4.93x10 ⁵ J/kg (212 BTU/lb) |

| Solubility in water | |
|---------------------|--|
| Temperature °C (°F) | Borax decahydrate % by weight in saturated solution |
| 0 (32) | 1.99 |
| 5 (41) | 2.46 |
| 10 (50) | 3.09 |
| 15 (59) | 3.79 |
| 20 (68) | 4.70 |
| 25 (77) | 5.80 |
| 30 (86) | 7.20 |
| 35 (95) | 9.02 |
| 40 (104) | 11.22 |
| 45 (113) | 14.21 |
| 50 (122) | 17.91 |
| 55 (131) | 23.22 |
| 60 (140) | 30.32 |
| 65 (149) | 33.89 |
| 70 (158) | 36.94 |
| 75 (167) | 40.18 |
| 80 (176) | 44.31 |
| 85 (185) | 48.52 |
| 90 (194) | 53.18 |
| 95 (203) | 58.94 |
| 100 (212) | 65.63 |



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| Solubility in some solvents | | |
|-----------------------------|--------------|---|
| Organic solvent | Temp °C (°F) | Borax decahydrate % by weight in saturated solution |
| Glycerol 98.5% | 20 (68) | 52.60 |
| Glycerol 86.5% | 20 (68) | 47.19 |
| Ethylene glycol | 25 (77) | 41.60 |
| Diethylene glycol | 25 (77) | 18.60 |
| Methanol | 25 (77) | 19.90 |
| Aqueous ethanol 46.5% | 15.5 (60) | 2.48 |
| Acetone | 25 (77) | 0.60 |
| Ethyl acetate | 25 (77) | 0.14 |

| 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 |
| Sodium metaborate | 10.52 | 10.84 | 11.00 | 11.18 | 11.44 |
| Borax decahydrate | 9.26 | 9.23 | 9.24 | 9.24 | (9.32)* |

*pH of borax decahydrate saturated solution (4.70%)

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