PRODUCT DATA SHEET

Borax Decahydrate

$Na_2B_4O_7 \cdot 10H_2O$
Sodium tetraborate decahydrate
Disodium tetraborate decahydrate
Borax 10 Mol
Grades: EP Excipient Granular and Powder; EP GMP Granular, Powder, and Special Powder; MG Granular; NF Granular and Powder; SP Granular and Powder; SQ Granular; and Technical Granular
CAS Number 1303-96-4

Multifunctional boric oxide source

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, white, crystalline, alkaline salt, with excellent buffering and fluxing properties.

Applications

Available in powder or granular form from U.S. Borax, borax decahydrate is an important multi-functional source of B_2O_3, particularly for processes in which the simultaneous presence of sodium is beneficial.

Industrial soap and detergents

Used in many industrial and institutional cleaning compounds as:

- pH buffering agent
- Oil emulsification aid
- Gentle abrasive

It is also used as an additive in polishes and waxes.

Metallurgical fluxes

Used to dissolve metal oxides 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.

Corrosion inhibition

Incorporated in many aqueous systems requiring corrosion inhibition, including automotive and engine coolant formulations, and various water treatment chemicals. Aqueous solutions of borax decahydrate have replaced chromates in railroad and other diesel engine coolants. It also protects ferrous metals against oxidation. Borax decahydrate's high solubility in ethylene glycol makes it especially useful in car antifreeze formulations. It neutralizes acidic residue resulting from the decomposition of ethylene glycol and minimizes the rate of oxidation at the surface of the metal.

Adhesives

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

Refractories

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

Wire drawing

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

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20 MULE TEAM BORAX™
Rio Tinto

Consumer products

Used in laundry detergents, to facilitate removal of oily soils from fabrics, stabilize enzymes, and soften water. Borax decahydrate is also used as a crosslinking agent to emulsify waxes and other paraffins used as a base for lotions, creams, and ointments. In contact lens solutions, it is used with boric acid as a gentle cleaner and buffering agent. Borax decahydrate is gentle to the skin, yet effective in removing dirt so it is added to powdered hand soaps as well.

Additional applications

Used as a flame retardant for cellulosic materials, a buffer and catalyst for organic dyes, a carrier for herbicides, and a degreasing buffer in enameling processes.

Characteristics

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)	4.93×10^5 J/kg (212 BTU/lb)

Solubility

5.93% by weight in saturated solution at room temperature

Solubility in water	
Temperature °C (°F)	
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
Ethylacetate	25 (77)	0.14

pH

Dissolved in water, it hydrolyzes to give a mildly alkaline solution, and 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.

Melting point

743°C (1369°F), starts losing water at 62°C (144°F) in an enclosed space

Stability

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. It will slowly lose water of crystallization if exposed to a warm, dry atmosphere. Conversely exposure to a humid atmosphere causes caking. When storing, avoid wide fluctuations in temperature and humidity, and maintain package integrity.

Containers

May be available in bulk, IBCs, or small bags

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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About U.S. Borax

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates—naturally-occurring minerals containing boron and other elements. We are 1,000 people serving 650 customers with more than 1,800 delivery locations globally. We supply around 30% of the world's need for refined borates from our world-class mine in Boron, California, about 100 miles northeast of Los Angeles.

About 20 Mule Team products

U.S. Borax produces the *20 Mule Team*® borates family of products from naturally occurring minerals and have an excellent reputation for purity and safety when used as directed. Borates are key ingredients in a number of industrial applications including fiberglass, glass, ceramics, batteries and capacitors, wood preservatives, and flame retardants.

High quality, high reliability, high performance borate products. It's what we're known for.