

# Ammonium Pentaborate



## Ammonium Pentaborate Tetrahydrate

Technical Grade: Powder

Special Quality (SQ) Grade: Granular

CAS Number 12046-04-7

Ammonium pentaborate is a product resulting from the controlled reaction of ammonia, water and boric acid. It is an alkaline salt and consists of white crystalline granules. Ammonium pentaborate is used where a readily soluble alkali borate is needed or where alkali metals cannot be used.

## Applications and benefits

### Electrolytic capacitors

Special quality grade ammonium pentaborate is used in the preparation of both wet and dry electrolytic capacitors. It is a component of electrolytes for: (1) developing a thin oxide film on aluminum foil when an electric current is applied; and (2) inserting into an aluminum container during the final assembly of capacitors. Purity of the components (boric acid, borax and ammonium pentaborate) is essential to the production of high quality capacitors.

### Corrosion inhibition

Ammonium pentaborate is incorporated in some proprietary water treatment chemicals for corrosion inhibition. It protects ferrous metals against oxidation.

### Welding/soldering/brazing fluxes

Ammonium pentaborate is an excellent solvent for metallic oxides at high temperatures. In the field of metallurgy, it is used in the preparation of special welding, soldering and brazing fluxes for stainless steel or various non-ferrous metals, where alkali borates cannot be used.

### Flame proofing

Borates change the oxidation reactions in the combustion of cellulosic materials to cause the formation of carbon residue. This charring action forms a barrier to combustion, and diverts the decomposition products that would alternatively smolder. Ammonium pentaborate solutions can be sprayed on paper or the paper can be dipped into the solutions to yield a fire-retarded product. It can also be used as an ingredient in other flame proofing formulations for cellulosic materials. In polymer applications, Ammonium Pentaborate can be used as an effective flame retardant in epoxy, TPU, urethane foam, etc.

### Refractories

Ammonium pentaborate can be used in gunning and patching compounds for extending the life of basic refractories in steel furnaces, due to its stabilizing effect.

## Chemical and physical properties

### Stability

Ammonium pentaborate shows little tendency to cake except after prolonged storage or if it becomes severely wetted by rain or substantial water penetration. It is also capable of absorbing moisture if exposed to a humid environment.

### Theoretical composition

Boric oxide, B <sub>2</sub> O <sub>3</sub>	63.95%
Ammonium oxide, (NH <sub>4</sub> ) <sub>2</sub> O	9.57%
Water of crystallization, H <sub>2</sub> O	26.48%

### Melting point

Ammonium pentaborate is stable to about 110°C at which point it loses all but two moles of water. If heated sufficiently, ammonium pentaborate will release the balance of its hydration water and decompose to boric oxide and ammonia.

### Hydrogen ion concentration

Aqueous solutions of ammonium pentaborate show a slight decrease in pH with increasing concentration:

Ammonium Pentaborate (wt.)	pH @ 25°C (77°F)
0.1%	8.48
0.5%	8.44
1.0%	8.35
2.0%	8.16
5.0%	7.74
10.0%	7.32

### Characteristics

Molecular Weight	544.30
Specific Gravity	1.58

### Solubility in water, as NH<sub>4</sub>B<sub>5</sub>O<sub>8</sub>·4H<sub>2</sub>O

Temp °C (°F)	% by weight
0 (32)	5.4
5 (41)	6.3
10 (50)	7.3
15 (59)	8.4
20 (68)	9.6
25 (77)	10.9
30 (86)	12.4
35 (95)	13.7
40 (104)	15.5
45 (113)	17.4
50 (122)	19.6
55 (131)	21.9
60 (140)	24.8
65 (149)	27.6
70 (158)	30.4
75 (167)	33.2
80 (176)	35.9
85 (185)	38.6
90 (194)	41.2

**Notice: Before using these products, please read the Product Specifications, the Safety Data Sheets and any other applicable product literature.** The descriptions of potential uses for these products are provided only by way of example. The products are not intended or recommended for any unlawful or prohibited use including, without limitation, any use that would constitute infringement of any applicable patents. Nor is it intended or recommended that the products be used for any described purposes without verification by the user of the products' safety and efficacy for such purposes, as well as ensuring compliance with all applicable laws, regulations and registration requirements. Suggestions for use of these products are based on data believed to be reliable. The seller shall have no liability resulting from misuse of the products and provides no guarantee, whether expressed or implied, as to the results obtained if the products are not used in accordance with directions or safe practices. The buyer assumes all responsibility, including any injury or damage, resulting from misuse of the product, whether used alone or in combination with other materials. THE SELLER MAKES NO EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THE SELLER SHALL HAVE NO LIABILITY FOR CONSEQUENTIAL DAMAGES.