

# Ammonium Pentaborate



Ammonium Pentaborate Tetrahydrate

Technical Grade: Powder

Special Quality (SQ) Grade: Granular and Technical Powder

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
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, spumific agent, and char promoter in epoxy, TPU, and urethane foam amongst others.

### 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.

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## 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%

Characteristics	
Molecular Weight	272.15
Specific Gravity	1.58

### 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

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Solubility in water, as $\text{NH}_4\text{B}_5\text{O}_8 \cdot 4\text{H}_2\text{O}$	
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)	30.5
75 (167)	33.2
80 (176)	35.9
85 (185)	38.6
90 (194)	41.2

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