Product Data Sheet

Solubor®

20.5% B Typical
$Na_2B_8O_{13}{\cdot}4H_2O$
Disodium Octaborate Tetrahydrate

20 MULE TEAM BORAX™
RioTinto

Background

Boron is one of seven micronutrients essential to all plant growth. Its role was recognized first in the 1920s and since that time, boron deficiency has been recognized in a wide range of crops.

Correcting boron deficiency

Boron deficiency can be remedied by the correct application of a borate containing material in solid or liquid fertilizers, to the seedbed in annual crops or under the foliar canopy of perennial crops. Perennial and annual crops can also be sprayed with boron containing solutions. These are normally tank mixed with other micronutrients or with agrochemical products.

The latter method of application may be preferable since at peak requirement times the boron needs of the growing plant can frequently exceed its ability to obtain its needs through the roots. Mixing with other sprays as part of a program enables the grower to time this availability and save application cost.

Detecting boron deficiency

Boron deficiency shows in clearly defined ways in certain crops. Generally, by the time visible symptoms are seen, yields will already have been adversely affected. The best way to establish need is either through soil testing or through tissue analysis. In this way, boron supplementation can form part of a 'balanced nutrition' approach to crop fertilization.

Predicting boron deficiency

Certain crops worldwide are known to be more susceptible to boron deficiency than others. These are shown in the tables.

Susceptible		
Alfalfa (Lucerne)	Coffee	Olive
Apple	Cotton	Pine
Broccoli	Eucalyptus	Red beet
Carnation	Grape	Rutabaga
Cauliflower	Groundnut	Sugar beet
Carrot	Mangold	Sunflower
Celery	Oil palm	Swede
Chrysanthemum	Oilseed rape	Turnip

Moderately susceptible		
Banana	Cocoa	Pear
Brussels sprout	Coconut	Poppy
Cabbage	Flax linseed	Potato
Chinese cabbage	Hops	Tea
Citrus	Maize Corn	Tobacco
Clover	Papaya	Tomato

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There are several factors which need to be taken into account when boron deficiency may be suspected:

- High rainfall
- Recent liming (pH higher than 6.6)
- Previous cropping
- Boron removal by previous crops
- No boron nutrition
- Sandy soils
- High organic matter

Additional reading

Boron Deficiency—Its Prevention and Cure, by V.M. Shorrocks. (available from U.S. Borax on request)

Mineral Nutrition of Higher Plants, by Horst Marschner, Academic Press.

Boron and its Role in Crop Production, by Umesh C. Gupta. CRC Press.

Solubor is manufactured to combine the highest concentration of boron with the maximum possible dispersion and solubility in water. As such, it has a number of different uses in agro-industrial markets, in addition to its long established role in farm sprays.

To calculate the amount of *Solubor* required, multiply the elemental boron required by 4.8.

Main uses

- Manufacture of solution or suspension fertilizers. Optimized dissolution at low ambient temperatures and high concentration make *Solubor* the product of choice.
- Formulation of high performance liquids containing either boron alone or a combination of nutrients for spraying, 'fertigation,' or irrigation
- Inclusion in multi-element soluble powder formulations for spraying on farm
- To provide boron through irrigation, fertigation, or hydroponics where this is the most practical form of plant feeding

Advantages

Rapid dispersion

The amorphous particles of *Solubor* facilitate rapid wetting and incorporation in water and more viscous liquids, even at low temperatures.

High solubility

The minute particle size of *Solubor* (<75 microns) and inherent high solubility, even at low temperatures, gives rapid solubility properties even under demanding conditions.

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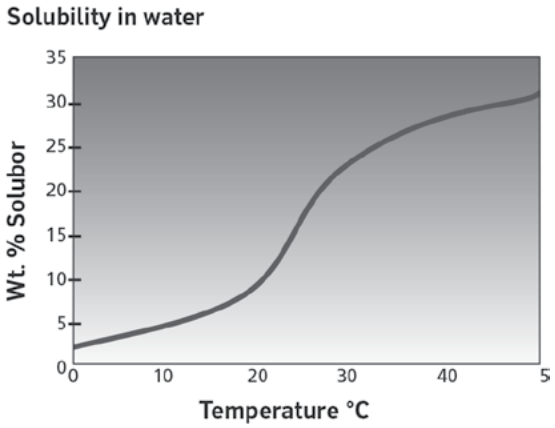

Temperature °C	Temperature °F	Weight % of *Solubor* in saturated solutions	Percent concentration of boron (B) in saturated solutions
0	32	2.5	0.5
10	50	4.5	0.9
20	68	9.7	2.0
30	86	21.9	4.6
40	104	27.4	5.7
50	122	34.3	7.2

Minimal crystallisation effect

Solubor causes minimum changes to crystallization temperatures or density of formulations. Experience has shown that levels of up to 2.7% *Solubor* can be added to the more common liquid fertilizer formulations while maintaining crystallization temperatures below 1.7°C (35°F).

High boron content (20.9% typical)

The relatively small quantities of *Solubor* needed to correct deficiency (and therefore for addition to formulations) make it an economical source of boron for manufacturers.

pH buffering action *Solubor* has a slight buffering action and maintains pH in solutions.	
Percent *Solubor* by weight of solution	pH at 23°C (73.4°F)
1	8.5
2	8.4
5	8.0
10	7.6
15	7.3

Bulk density		
Pack type	kgm-^{3}	lb./cu. ft.
Loose pack	500	25
Tight pack	560	35

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