BROCHURE

Borates in swimming pools

Borates are ubiquitous. They are mined and refined for a variety of incredibly diverse applications. Their cost-effectiveness makes them ideal for use in swimming pools.

Introduction

In swimming pools, borates' greatest asset is their multi-functionality. They are able to:

- Improve swimmer comfort by reducing red eye and skin irritation when compared to chlorine
- Soften water
- Reduce scaling
- Improve water clarity
- Reduce corrosion
- Save energy
- Be added easily and dissolve instantly
- Improve oxidizer performance and longevity (typically chlorine)
- Provide exceptional buffering capacity

Borates provide both chemical and aesthetic benefits to pools as well as potentially increasing the longevity of pool plaster and other equipment.

Unlike most other water additives, borates are permanent and do not degrade or evaporate from pool water with time. A single dose application will only need very minor top up, perhaps once a year, depending on how much has been removed by rainwater influx or back washing.

Borates are effective; and the newest formulations offer better solubility and pH control.

An effective additive

As one of Earth's elements, boron is naturally present as a "borate" in rocks, soil, and water. Our borate products come from one of the largest natural mineral deposits in the world, operated by U.S. Borax in Boron, California.

Borates do not bio-accumulate and are not absorbed through intact skin. For more information, we have a product stewardship team that can address specific questions and supply safety data sheets for our products.

Borates for pool use

Two common issues in swimming pool products—poor solubility and incorrect pH—have been corrected with newer borate technology: Disodium octaborate tetrahydrate (DOT). Sold as *Polybor*® by U.S. Borax, his form of borate is spray-dried rather than granular. It has a more neutral pH (≈8.5), so it needs less adjustment to bring the pool pH back in balance. It also has the advantage of carrying significantly more active ingredient than traditional systems (67% B_2O_3 vs only 36% B_2O_3 in borax). *Polybor* is highly soluble and easily added to pool water.

Importantly, the pH of *Polybor* is above the pH 7.4-7.8 typically desired to properly maintain most pools. When used in pools at typical dilution, the formulation has an ideal pH of ≈7.6. Above pH 8, the chlorine becomes much less effective as a sanitizer, but below pH 7.4 the equilibrium trends toward hypochlorous acid and chlorine is lost more rapidly.

What do borates do?

Borates' most important role in pool water is to serve as a buffer. The importance of pool pH has already been mentioned, but it cannot be overemphasized. Borates are excellent at holding pH. Maintaining pH is essential to:

- Allow chlorine or other oxidizers to perform as sanitizers and kill bacteria and viruses in the water
- Minimize rapid loss of chlorine
- Slow corrosion and breakdown of pool plaster
- May reduce eye and skin sensitivity when compared to chlorine
- Reduce scaling and water cloudiness while improving pump efficiency

BROCHURE: BORATES IN SWIMMING POOLS

Borates and algae growth

Many chemical compounds can perform as buffers, but the two most effective and strongest are phosphates and borates. Phosphates work well, but as an essential nutrient for algal growth, it is not sensible to add it to pool water. Borates can be used as a complete replacement for alkalinity.

Borates and corrosion

Borates have been used for many years as corrosion inhibitors and are particularly effective on steel and zinc. Borates act as an anode inhibitor—having insufficient oxidizing power of their own—but in the presence of oxygen, they become effective. They have been used successfully in water treatment and in applications such as closed loop cooling systems and in automobile anti-freeze. Borates could be used to reduce the premature failure of equipment (heaters and ladders) in, for example, chlorine generating pools.

Pool clarity

The presence of cloudiness and scale in pools is a major aesthetic issue. Cloudiness can be caused by a number of factors, one of which is water hardness caused by high calcium content that can also lead to scale formation. Scale is formed when salts, such as calcium carbonate or calcium sulfate, crystallize from solution on the pool sides.

Borates help in three ways:

1. They are good buffers, so generally prevent scaling
2. They lock up calcium almost like a chelate to prevent its formation
3. Borates in a pool can give the water a softer feeling, which is gentler on the skin

All of the various benefits of borates in pool water and new technological advances make borates—specifically *Polybor*—the preferred pool treatment method.

Use and registration

U.S. Borax products are available for use in the United States and Canada only with an EPA FIFRA or Canada PMRA registered product. Borates are not approved for use in pools and spas in the European Union (EU). Regular industrial grade U.S. Borax products cannot be used in swimming pools. Contact your regional sales manager to determine the correct U.S. Borax product for your particular application.

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.

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