Life Depends on Boron

As one of the 109 elements that make up the planet, it's not surprising that boron is all around us — in soil and water, plants and animals. Although the element boron does not exist by itself in nature, it occurs in combination with oxygen and other elements in salts, commonly called "borates."

Just as borates have been a part of nature since the earth's formation, they have also been put to many productive uses since the beginning of civilization. Artisans in ancient cultures relied on borates, as do glassmakers and potters today. Before the 19th century, concentrated borates were a rare treasure, transported from the Far East into Europe along trade routes taken by Marco Polo's caravans. Today, deposits of borates large enough to mine efficiently are still rare, but usage has increased to the point that most industries on every continent use boron compounds to manufacture products that are essential to modern life.

Borates are all around you in all aspects of your life. Here are some places you can find them…

Boron in plants and soil

Although the first verifiable use of borates dates back to the 8th century AD, mankind has relied on them unknowingly since the advent of agriculture, nearly 10,000 years ago. In fact, plants cannot grow without boron. Boron is an essential micronutrient, integral to a plant's life cycle. Required only in small amounts, boron is necessary in plants to control flowering, pollen production, germination, and seed and fruit development. Boron also ensures the healthy transport of water, nutrients, and organic compounds to growing portions of the plant.

While boron is naturally present in all soil, there are some regions where heavy rainfall, geological characteristics, or farming practices have leached the boron from the land, leaving too little to support plant and crop survival. It's not surprising that fertilizers are one of the main products formulated with borates. Fertilizers containing borates have proven effective in increasing the productivity of soil in regions where natural borate levels are low. Some crops require relatively large supplements of boron, too, including cotton, corn, alfalfa, and soybeans.

Boron in food

As plants draw borates from the soil, the boron is distributed throughout the stems, leaves, roots, and other structures. When people eat plant-derived foods — such as fruits, vegetables, nuts, and legumes — they routinely absorb small amounts of boron. Studies indicate that people in a wide variety of cultures consume about one to three milligrams of boron per day through a combination of foods and drinking water in their local diets. Although it has not yet been proven that humans need boron to live, there is almost universal agreement in the scientific community, including the World Health Organization, that boron is nutritionally important to maintain optimal human health. Most of us ingest a healthy amount of boron each day as a result of our normal fruit and vegetable intake. If not, many beverages, including coffee, wine, and beer, do the job as well.

Our bodies are very familiar with boron in our environment and they efficiently manage our daily dietary intake by using what is required and excreting the rest. In fact, regardless of the source of boron exposure, once it is ingested or inhaled, our bodies handle it just as they do any other nutrient.

Boron at home

Apart from the boron in your environment and diet, the element B is a key ingredient in an extensive array of household products.

Borates in roofing materials, wallboard, and both fiberglass and cellulose insulation protect us from the elements. As a treatment for the wood, plastic, bricks, pipes, and wires used to construct your home, borates protect from decay, fungi, and insects, and in some applications, act as a flame retardant.

Inside the home, you can find borates in the ceramic tiles on the floors and walls and the porcelain enamel covering sinks, refrigerators, pots, and pans. The pantry is loaded with borates in food, but you can also find them in your everyday heat-resistant cookware and the lead-free crystal you bring out for guests.

Move to the bathroom and boron abounds. Soaps, cold creams, face lotions, makeup, shaving cream, contact lens solutions, hair straighteners, eye drops, and foot soaks, as well as denture cleaners and adhesives, are all made with boron compounds.

Getting dressed requires borates, too. Cotton fabrics wouldn't exist without boron to ensure fiber yield in the field, and nylon processing depends on borates too. Keeping those clothes clean is an array of detergents, laundry boosters, and bleaches made with borates. Coffee pot cleaners and carpet cleaners are also borate-based. Even these products' packaging have borates in the adhesive that holds them together.

When the house is clean, meals are cooked, and the laundry finished, you can still find borates at work. They're used to make a wide range of sporting equipment — from surfboards, and golf clubs to snowmobiles and jet skis. The liquid crystal displays (LCDs) in digital watches, laptop computers, and flat screen televisions also contain borates.

Having a barbecue? Don't forget the borates. They're in the charcoal in the grill and even the swimming pool as a water treatment. Borates can even help get rid of uninvited barbecue guests as pest control products effective against termites, beetles, ants, cockroaches, silverfish, and earwigs. In bright light, borates in your light-sensitive sunglasses protect your eyes; at night, they sparkle in fireworks.

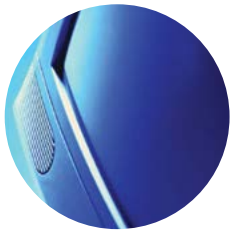
Boron in industry

It would be as hard to find a green plant without boron as it would be to find a borate-free industrial plant. Borates are in magnets, sandpaper, and grinding wheels.

In the transportation sector, borates are used to make antifreeze, motor oil, brake fluid and power steering fluid for cars, trucks, and aircraft. There are borates in your halogen headlights, and in the lights that line the 32-mile Channel Tunnel that connects England and France.






High tech manufacturers need borates to make capacitors, transistors, semiconductors, and other microelectronics that build the computers that connect the world. If you still insist on hard copy, consider that borates also improve the quality and brightness of recycled paper.

Nuclear energy producers use borates in their containment and protection systems. In addition to protecting, borates preserve. They're used to restore historic buildings and ships, as well as for drying flowers and taxidermy.

Scientific glassware — from laboratory vessels to microscopes and telescopes — is made with borates. Medicine also relies on boron compounds for cancer treatment and pharmaceutical production.

The arts and entertainment industry relies on borates for everything from art glass, gold and silversmithing to building communications satellites.

Very few modern industries can get by without borates, and very few people can get by without their products. When you consider the role boron plays in plant life, and by extension, all life, it's hard to imagine our world without it.

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 500 customers with more than 1,700 delivery locations globally. We supply 30% of the world's need for refined borates from our world-class mine in Boron, California, about 100 miles northeast of Los Angeles. We pioneer the elements of modern living, including:

- Minerals that make a difference: Consistent product quality secured by ISO 9001:2015 registration of its integrated quality management systems
- People who make a difference: Experts in borate chemistry, technical support, and customer service
- Solutions that make a difference: Strategic inventory placement and long-term contracts with shippers to ensure supply reliability

About *20 Mule Team*® products

20 Mule Team borates are produced from naturally occurring minerals and have an excellent reputation for safety when used as directed. Borates are essential nutrients for plants and key ingredients in fiberglass, glass, ceramics, detergents, fertilizers, wood preservatives, flame retardants, and personal care products.

20 MULE TEAM BORAX™

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