

Borates' Health and Safety Effects

Fact Sheet

The earth consists of trace amounts of more than 200 minerals that contain boron. Every member of the plant world relies on boron to grow. Naturally, boron is also part of a healthy diet for people. Boron—or industrial minerals called borates—can be found in thousands of products and processes that contribute to a better standard of living. But even a good thing—like this naturally occurring, nutritionally-important element—can be harmful if it is intentionally abused. Here are answers to commonly asked questions about boron and its health and safety effects and benefits.

Are borates safe?

The safety of borates has been vigorously evaluated. In trace amounts, they're essential micronutrients for plants and believed to be nutritionally important for people. In extreme doses, they can make you ill. To put things in perspective, borates are about as acutely toxic as table salt. The United States Food and Nutrition Board (FNB) recognized the safety of boron by establishing a Tolerable Upper Intake Level (UL) for boron of 20 milligrams per day.

How can they be safe and unsafe at the same time?

Like many trace elements, borates are both essential at low concentrations and toxic at high concentrations. Borates are considered safe because it's extremely unlikely that people would ever be exposed to the levels necessary to reach toxicity. While hazard is associated with consuming high doses of borates over a long period of time, there are biological reasons that make it almost impossible for people to be exposed to high enough concentrations of borates in their daily lives to harm their health.

What do animal studies show?

Scientists conduct studies to determine both the level at which boron is harmful, and the level at which boron is beneficial to health. Animals that ingested high doses of borates over long periods of time have shown adverse developmental and reproductive effects. In studies where boron is completely removed from the diet and environment, similar effects have been observed. In other words, too much boron is as bad as too little.

What do studies of populations or workers exposed to high levels of borates show?

No evidence of adverse reproductive effects attributable to boron have been observed in epidemiological studies of borate workers and populations with high exposures to boron. The only reactions to borates observed in workers under certain exposure conditions are irritative symptoms in the eyes or upper respiratory tract.

What would happen if you accidentally ingested a very high dose of borates?

An extremely high intake of borates would make most people vomit. But it is nearly impossible to be exposed to such quantities through eating foods or using products that contain borates. We've been mining and refining borates for more than 150 years. Evaluation of our workers—who are exposed to higher levels of borates than most people—have shown none of the adverse health effects reported in animal studies. In most instances where people have experienced artificially high borate intake, vomiting or excretion in urine has been rapid, and blood and tissue concentrations were shortly back to normal.



How do our bodies absorb boron?

When people eat plant-based food, they absorb small amounts of boron. Studies indicate that people in a wide variety of cultures consume about one to 3 milligrams of boron per day through a combination of foods and beverages. There is almost universal agreement in the scientific community—including the World Health Organization—that boron is nutritionally important to maintaining optimal human health.

How do our bodies remove boron?

It's important to note that boron does not accumulate in the body. In fact, regardless of the source of boron exposure, once it is ingested or inhaled, our bodies use what is needed and excrete the rest.

What does boron do to keep you healthy?

While researchers are still determining the exact role that boron plays in maintaining and promoting health, its importance in energy metabolism, bone health and strength, and brain function has been established.

What does U.S. Borax do to protect people from possible risk?

All of U.S. Borax's operations comply with all applicable safety regulations and make safety training a priority. Our practices and products are in good standing in the nearly 100 countries in which we do business. We're confident that our employees and our customers' employees have adequate information and training to handle borates safely, and we don't sell products for any uses that we cannot demonstrate are safe for consumers. We're also committed to communicating what we know about the health, safety and environmental impacts of borates as widely as possible. We produce Safety Data Sheets (SDS) on all our products that clearly outline safe use and handling practices. These SDS are given to our customers, available to the public, and on file with regulatory agencies around the world.

What do government organizations have to say about boron?

Most major risk assessment organizations around the world have studied boron—including the World Health Organization, the United States Environmental Protection Agency and the National Academy of Sciences—and most are satisfied that standing regulations are more than adequate to protect people, animals, and the environment. In fact, some regulatory bodies are focusing their energies on determining how much boron people need each day to stay healthy.

Despite all evidence that borates are safe for people and the environment, the European Commission reached a decision to classify borates as reproductive toxicants in September 2009. They based their decision on animal studies that do not reflect human exposure under conditions of normal handling and use, and ignored the fact that people's greatest exposure to borates is through a healthy diet. While we disagree with the classification and remain confident that our products are safe, we comply with this classification and it is reflected on our Safety Data Sheets and product labeling accordingly.

Does it make sense to regulate the use of borates even more?

No, not when you consider the facts about how people are exposed to borates and in what amounts. Borate products have been used safely for more than 100 years and we believe that more stringent regulations would alarm people for no good reason. As world leaders in borates, we're obligated to raise these points in the appropriate manner and forum—on our behalf, our customers' and on behalf of the consumers who need borate-based products and eat foods containing borates.

For more information about borates' health and safety effects and benefits, please contact:

Product Stewardship
rtbproduct.stewardship@riotinto.com
www.borax.com/stewardship

20 MULE TEAM BORAX™

borax.com