

June's Rock— Bauxite

Bauxite is not a mineral. It is a rock formed from a laterite soil that has been severely leached of silica and other soluble materials in a wet tropical or subtropical climate. It is the primary ore of aluminum. Almost all of the aluminum that has ever been produced has been extracted from bauxite.

Physical Properties of Bauxite

Bauxite is typically a soft (H:1-3), white to gray to reddish brown material with a pisolitic structure, earthy luster and a low specific gravity (SG: 2.0-2.5). These properties are useful for identifying bauxite; however, they have nothing to do with bauxite's value or usefulness. This is because bauxite is almost always processed into another material with physical properties that are distinctly different from bauxite.

Bauxite Used for Aluminum Production

Bauxite is the principal ore of aluminum. The first step in producing aluminum is to crush the bauxite and purify it using the Bayer Process. In the Bayer Process, the bauxite is washed in a hot solution of sodium hydroxide, which leaches aluminum from the bauxite. The aluminum is precipitated out of solution in the form of aluminum hydroxide, $Al(OH)_3$. The aluminum hydroxide is then calcined to form alumina, Al_2O_3 .

Aluminum is smelted from the alumina using the Hall-Heroult Process. In the Hall-Heroult Process, the alumina is dissolved in a molten bath of cryolite (Na_3AlF_6). Molten aluminum is removed from the solution by electrolysis. This process uses an enormous amount of electricity. Aluminum is usually produced where electricity costs are very low.

Use of Bauxite as an Abrasive

Calcined alumina is a synthetic corundum, which is a very hard material (9 on the Mohs Hardness Scale). Calcined alumina is crushed, separated by size, and used as an abrasive. Aluminum oxide sandpaper, polishing powders, and polishing suspensions are made from calcined alumina.

Sintered bauxite is often used as a sand-blasting abrasive. It is produced by crushing bauxite to a powder and then fusing it into spherical beads at a very high temperature. These beads are very hard and very durable. The beads are then sorted by size for use in different types of sandblasting equipment and for different sandblasting applications. Their round shape reduces wear on the delivery equipment.

Bauxite Localities

Bauxite is found in abundance at many locations around the world. In 2010 the ten leading baux-

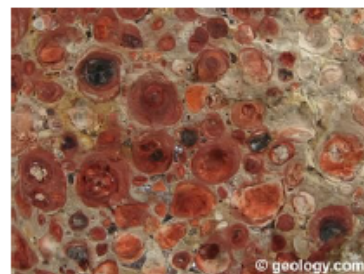
Physical Properties of Bauxite

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| Color | White, gray, sometimes stained yellow, orange, red, pink, or brown by iron or included iron minerals. |
| Streak | Usually white, but iron stain can discolor. |
| Luster | Dull, earthy |
| Diaphaneity | Opaque |
| Cleavage | None |
| Mohs Hardness | 1-3 |
| Specific Gravity | 2—2.5 |
| Diagnostic Properties | Often exhibits pisolitic structure; color |
| Chemical Composition | Variable but always rich in aluminum oxides and aluminum hydroxides |
| Crystal System | n/a |
| Uses | Primary ore of aluminum, also used as an abrasive |

ite producing countries were: Australia, China, Brazil, India, Guinea, Jamaica, Russia, Kazakhstan, Suriname, and Greece.

The United States has small amounts of bauxite in Arkansas, Alabama, and Georgia; however, there is very little mining of bauxite in the United States, and at least 99% of consumption is imported.

Pisolites in bauxite: Close-up view of bauxite from Little Rock, Arkansas exhibiting a pisolitic structure and characteristic red iron staining.



Bauxite without pisolites: Bauxite from Demerara, Guyana. Some specimens of bauxite do not have the pisolitic structures. Specimen is approximately 4 inches (10 centimeters) across.