Bastnasite: Characteristics, Origin and Applications by Judy

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Learn more about the mineral called bastnasite - its characteristics, history, and uses and applications.

Part of the carbonate group of minerals is a rare earth metal (REM)-rich mineral called Bastnasite. Bastnasite is one of the leading sources of cerium, a rare earth metal with various applications in modern industries and technologies. It closely resembles parasite, another mineral with high rare earth mineral content; the two are known to alter easily back and forth between bastnasite to parisite and back depending on the presence of CaC03.

Characteristics

Bastnasite sometimes appears as a reddish brown or as a golden yellow mineral but is also found in other colors such as pale white, tan, gray, and brown, sometimes with white streaks present. It is a vitreous and greasy mineral, with its crystals appearing either translucent or opaque. It has a chemical formula of (Ce,La,Y)CO3F and falls under the 4 to 5 rating in the Mohls hardness scale.

Origin and History

Like other minerals, Bastnasiteâ€™s name lends a clue to its origin. A Swedish chemist, Wilhelm Hisinger, owned a mine near Riddarhytan, Vastermanland, Sweden. It was called Bastnas Mine, hence Basnasiteâ€™s name. Prior to describing and christening the mineral bastnasite in 1838, Hisinger already made discoveries from the mine, such as cerium (a rare earth mineral) in 1803, and lanthanum (another rare earth metal) in 1839, just a year after officially naming the mineral bastnasite.

Aside from Bastnasite, the Bastnas Mine also yielded minerals and chemical elements that were undiscovered until then. These discoveries were made by other known Swedish scientists at the time, such as Jons Jakob Berzelius and Carl Gustav Mosander, the man who discovered the rare earth metals Terbium, Yttrium, and Erbium.

Bastnasite has been found in Hungary, Greece, and Norway in Europe; Turkey, Mongolia, and Russia in Asia; and Canada and the United States in North America.

Uses and Applications

Bastnasite-(Ce) (what people usually have in mind when they say bastnasite) is mined for its rich cerium content. Along with monazite, a phosphate mineral, bastnasite is one of the two largest sources of the rare earth metal cerium. Cerium is used primarily as a chemical oxidizing agent and as fluid catalytic cracking catalyst used for oil refineries. Other uses of cerium include polishing powder and yellow pigment for use in ceramics and glass.

But cerium is not the only thing found in bastnasite. Aside from bastnasite-(Ce), there are also lanthanum-rich and yttrium-rich bastnasites. Bastnasite-(Y), the type that is rich in yttrium, is tapped for its predominant rare earth metal content. Yttrium has several uses in industries and technology, from yttrium vanadate (YVO4) used in high-temperature superconductors to yttrium iron garnet (YIG) microwave filters and yttrium-aluminum garnet (YAG) lasers. Bastnasite-(La), on the other hand, contains high levels of lanthanum, another rare earth metal with various applications. Lanthanum is a main component of camera lenses, battery electrodes, and hydrogen storage. It is

particularly important in high refractive index glass and, like cerium, is used in oil refineries as a fluid catalytic cracking catalyst.

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