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Apatite Mineral Essay

Apatite is not one specific mineral, but rather the term for a group of minerals, the so-called apatite group (Mindat, 2015). The apatite group consists of a variety of calcium phosphates, and can be found in igneous, metamorphic and sedimentary rocks (Piccoli, 2002). Despite not being one mineral, Apatite fits the definition of a true mineral; a true mineral must be naturally occurring, solid at the conditions of the Earth's surface, have a well defined chemical formula and crystal structure with limited variation, and be inorganic (Mindat, 2015). Apatite occurs naturally through a variety of processes, and it is a solid at surficial conditions, and although the mineral species within the apatite group do vary in terms of exact chemical formula and crystal structure, they are all relatively similar (Mindat, 2015). Lastly, while specific formations of apatite can be formed organically from the remains of seafife, the majority of apatite occurrences are formed through inorganic processes, namely solidifying from melts (King, 2014).

Apatite group members are mostly composed of calcium, oxygen and phosphate, and the idealized end member formula given to apatite as a whole is $\text{Ca}_5(\text{PO}_4)_3(\text{Cl/F/OH})$ (Mindat, 2015). The apatite mineral group members do not contain silicate, and as such are not silicate minerals; instead they are calcium phosphates (Mindat, 2015).

A particularly notable physical property of the apatite group is their hardness; specifically the fact that the apatite group is used to define a 5 on the Mohs hardness scale (International Gem Society, 2023). Despite the slight variance between different species within the apatite

group, all of the member species are close enough to hardness 5 to be used as a reference for it (International Gem Society, 2023).

Minerals from the apatite group come in a wide variety of colors, including blue, yellow, and pink, depending on their species (King, 2014). Apatite gems may be either transparent or translucent, but some non-gem species are opaque (King, 2014). The apatite group has a hexagonal crystal system, and the crystals generally have hexagonal prism and two pinacoid forms, with a tabular habit (Mindat, 2015). The luster tends to be glassy, both in gemstone form and non-gem minerals (King, 2014). Apatite group members have two planes of cleavage but they do not form clearly, and poorly defined even when they are distinguishable (Mindat, 2015)(King, 2014).

Apatite was named by Abraham Gottlob Werner, after the Greek verb *apatáō*: to deceive (Mindat, 2015). The word *apatáō* was selected because of the apatite group's tendency to be misidentified, deceiving the person attempting to identify it (Mindat, 2015).

Apatite minerals are the 10th most common on Earth, and as one might expect from such an abundant mineral, can be found in many rock systems (Hughes, 2015). Apatite that has solidified from melts can be found in igneous and metamorphic systems, while apatite from organic remains can be found in sedimentary and metamorphic rock systems (Hughes, 2015).

While apatite is well known as a reference for a value of 5 on Mohs hardness scale, but this is not its most common use (Hughes, 2015). The majority of apatite is used to produce a nitrogen rich fertilizer for crops, in order to produce enough food to supply Earth's ever-growing population (Hughes, 2015).

Works Cited

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