The Chemical and Physical Properties of Kyanite as it Relates to Landscape Evolution

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Abstract

Kyanite is an aluminosilicate, and one of three Al_2SiO_5 polymorphs. It is common worldwide and can be found in the United States throughout the Appalachian Mountains. It is a refractory mineral commonly used in the production of linings for boilers, kilns, and furnaces, as well as for spark plugs, and porcelain bath fixtures. The kyanite of the blue ridge was formed from sediment on the ocean floor of a prehistoric ocean which was metamorphosed in two separate orogenies, the Taconic and Alleghanian. Due to the high pressure under which it was formed kyanite has a unique crystal structure, and is part of a completely different crystal system than the other two Al_2SiO_5 polymorphs. It has a unique property of extreme anisotropic hardness, which is caused by its densely packed crystal structure. It is also resistant to erosion, and this can be tested over a period of time with either a rock tumbler or acid bath. This erosional resistance makes kyanite important in the evolution of certain landscapes, especially the mountains and monadnocks of North Carolina.