Pegmatite Encyclopedia Article

Pegmatite

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Contents

Pegmatite Encyclopedia Article.....1

Contents.....2

Pegmatite.....3

Pegmatite

A pegmatite is an intrusive igneous body of highly variable grain size that often includes coarse crystal growth. A pegmatite may be a segregation within an associated plutonic **rock** or a **dike** or vein that intrudes the surrounding **country rock**.

The composition range of pegmatites is similar to that of other intrusive **igneous rocks** and is indicated by using modifier, e.g., **granite** pegmatite or gabbro pegmatite. However, pegmatites occur most commonly in granites and the term applied alone usually refers to a granitic composition. The **mineralogy** of pegmatites can be simple or exotic. A simple granite pegmatite may contain only **quartz, feldspar**, and mica. More complex pegmatites are often zoned and can contain **minerals** like tourmaline, garnet, beryl, fluorite, lepidolite, spodumene, apatite, and topaz.

Pegmatites are formed as part of the cooling and crystallization process of intrusive rocks. As the parent body begins to cool, a sequential crystallization process occurs that concentrates many volatile constituents such as H_2O, boron, fluorine, chlorine, and phosphorous in a residual **magma**. In simple cases, the presence of residual **water** has simply allowed the magma to cool slowly enough to permit coarse crystal growth. More complex pegmatites are the result of the presence of numerous exotic volatiles that are eventually incorporated into rare minerals.

The most distinguishing characteristic of pegmatites is the unusually large crystal size of the minerals, which ranges from less than an inch to several feet. Single **crystals** of spodumene from the Black Hills have reached 40 ft (12 m) in length. A Maine pegmatite contained a beryl crystal 27 ft (8 m) long and 6 ft (1.8 m) wide. These exceptionally large crystals are not free-growing, rather they are intergrown with the rest of the pegmatite. However, pegmatites do produce large and beautiful individual crystals of many different minerals that are highly prized by gem and mineral collectors.

Pegmatites are also valued for the suite of rare elements that tend to be concentrated in the residual magmas. For example, beryllium is obtained from beryl, lithium from spodumene and lepidolite, and boron from tourmaline. Other rare elements obtained from pegmatites include tin, tantalum, and niobium.

See Also

Intrusive Cooling; Pluton and Plutonic Bodies