Migmatite Encyclopedia Article

Migmatite

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Migmatite

A migmatite, or "mixed rock" in Greek, is a banded, heterogenous **rock** composed of intermingled metamorphic and igneous components. Veins, contorted layers, and irregular pods of silica-rich **granite** occur within the structure of foliated **iron** and magnesium-rich metamorphic rocks like **gneiss**, **schist** and amphibolite. Because metamorphic rocks form by recrystallizaton of **minerals** without **melting**, and **igneous rocks** like granite form by crystallization of minerals from molten **magma**, it is difficult to explain their coexistence in a single rock. It is clear, however, that migmatites form at the threshold between high-grade metamorphic recrystallization, and complete igneous melting. Migmatites were partially melted during formation.

Some migmatites appear to have formed by intrusion of liquid granitic melt into a preexisting banded **metamorphic rock**. In these examples, the granite inclusions have sharp contacts with the metamorphic bands, and cut across the metamorphic fabric in places. In other cases, the boundaries between metamorphic and igneous components are gradational, or indistinct, suggesting that at least some migmatites form during a single phase of **partial melting** and fractional recrystallization. Metamorphic and igneous petrologists have rigorously debated these two hypotheses regarding the formation of migmatites. As is sometimes the case, both hypotheses are probably correct, and some migmatites form in several phases of **metamorphism** and melting, while others from during a single phase.

Migmatites generally occur in plate tectonic settings where regional belts of continental **crust** have been subjected to very high temperatures and pressures. The metamorphic portion of most migmatites includes the minerals horneblende, **plagioclase feldspar**, and garnet. This mineral assemblage indicates so-called amphibolite-grade metamorphism typical of convergent plate tectonic boundaries where rocks are subjected to very high pressures, strong directional stresses, and high temperatures.

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