
**Amphiboles document processes near the roof of
a mafic magma chamber: the Neoproterozoic
Greendale Complex, Antigonish Highlands,
Nova Scotia**

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The ca. 607 Ma Greendale Complex is located between the Hollow and Greendale faults in the Antigonish Highlands, and is a local representative of extensive arc-related magmatism in the Avalon terrane of the Canadian Appalachians. The complex is a roughly semi-circular body with a diameter of ca. 5 km and is composed of steeply dipping, intrusive sheets which define a distinct layering that may be centimetres to metres in width. The complex is heterogeneous with abundant evidence for mixing and mingling between its various components. It contains felsic, intermediate, mafic, and ultramafic compositions. The ultramafic rocks occur as discontinuous sheets and pods which are interpreted as boudins derived from early-formed layers. The felsic rocks occur in veins, as either conjugate sheets or networks and typically terminate in pegmatitic lenses. The mafic or intermediate rocks, which dominate the complex, are composed mainly of amphibole-rich porphyritic gabbro.

Amphibole occurs in all lithologies in the complex. In ultramafic rocks it poikilitically encloses olivine, clinopyroxene, and orthopyroxene. In mafic to intermediate rocks its texture vary from fine stubby phenocrysts to coarse (>10 cm) prismatic crystals growing perpendicular to the bounding walls of the dykes. In felsic rocks, the amphibole is less common (<10%), but generally occurs as prismatic minerals in a quartzofeldspathic matrix. The sensitivity of amphibole chemistry provides detailed information about the conditions of crystallization. Amphibole from the various Greendale Complex lithologies was analysed for major, trace, and rare earth elements by Laser Ablation at Memorial University, Newfoundland. These data provide insights into the crystallization histories near the roof of the pluton and allow the effects of temperature and varying magma composition on amphibole chemistry to be determined.