

Petrology and mineral chemistry of the Mount Brome Alkali Complex, Quebec

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The Mount Brome Alkali Complex is situated 190 km east of Montreal, Quebec, and is the largest and most easterly of the Monteregian Hills. The magma that formed the complex was emplaced hypabysally in the St. Lawrence River aulacogen by hot spot activity around 125 Ma. The surface exposure of the complex is 56 km². Mount Brome, after which the complex is named, is located on the northern tip.

The Mount Brome Alkali Complex is composed of gabbro and cogenetic alkali silica-undersaturated and silica-oversaturated rocks. The gabbro unit makes up the southeastern third of the complex and is composed of layered melanocratic and leucocratic rocks. The silica-oversaturated rocks are syenite and biotite monzodiorite. The syenite unit intruded the biotite monzodiorite unit as indicated by brecciation and recrystallization of the biotite monzodiorite along the contact with the syenite. The syenite contains numerous xenoliths of country rock and has a gradational relationship with silica-saturated and silica-undersaturated rocks. The silica-undersaturated rocks are nepheline-bearing syenite, sodalite-nepheline monzodiorite and sodalite-

nepheline monzosyenite. The nepheline-bearing syenite is gradational between the syenite and the sodalite-nepheline monzosyenite. The sodalite-nepheline monzosyenite contains up to 40% nepheline and sodalite and is gradational with the sodalite-nepheline monzodiorite. The sodalite-nepheline monzodiorite contains numerous inclusions of a diorite unit not exposed at the surface.

Chemical analysis with the electron microscope of minerals in the major units has revealed unusual mineral compositions and trends. The gabbro consists of three distinct sub-units: gabbro, alkali gabbro and poikilitic amphibole-bearing gabbro. Alkali feldspar compositions vary greatly and include barium-rich alkali feldspar with up to 17% BaO in the alkali gabbro. Alkali feldspars commonly display zoning and prominent perthitic or anti-perthitic texture. Plagioclase compositions generally range from andesine to oligoclase with more calcic compositions present in the gabbro. The rocks contain a variety of amphibole, ranging from ferro-actinolite to kaersutite. Titanite, rutile, ilmenite and titaniferous biotite are present in most units.