

INCLUSIONS OF CARBONATITE CALCITE FROM THE OKA COMPLEX, QUEBEC.

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Mineral inclusions in carbonatite calcite from the Oka complex, Quebec, Canada were examined. Samples include coarse-grained calcite from carbonatite, alnöite and glimmerite.

An isolated phlogopite was found in a calcite in coarse-grained sövite (Bond Zone). The phlogopite is prismatic, near 90 μm length-wise, titaniferous and sodic (Table 1). Two smaller phlogopite inclusions (< 50 μm) were found in a glimmerite calcite.

A totally enclosed euhedral calcite crystal, in a calcite from the very coarse-grained sövite (VCGS), approximately 110 μm in the longest dimension is close to but not epitaxially related to the host calcite. Lamellar twins and a set of fractures radiating from the inclusion can be interpreted by the thermal expansion coefficients of calcite, α_a and α_c , which differ in sign and magnitude, and interfacial stress. The calcite is not fluorescent.

A discrete magnetite was found in a calcite from pyroxene sövite. The magnetite is magnesian (5.8 wt.% MgO), approximately 80 μm in dimension. The magnetite in the sövite is less magnesian (up to approximately 5%) than the magnetite inclusion.

One zircon was recovered from an alnöite calcite (Bond Zone). Its composition is near stoichiometric zirconium silicate, with minor iron, and poor in heavy elements.

Alkali halides (NaCl and KCl) were identified in some calcites in the VCGS. Where inclusions are aligned, it is possible they are located in a healed fracture possibly extending to the surface, and secondary in origin. One VCGS calcite contains over 40 crowded halide inclusions.

Twinned calcites examined contain inclusions more frequently than single crystals. Contact twins defined by a c-axis twin law and {0112} twin law are common. Penetration twins are also present. Etched sections across composition planes reveal association of some inclusions with twinning. Doubly twinned and multiply twinned calcites examined, however, are not more inclusion-rich than single twins. Therefore inclusions are not necessarily promoted by twinning.

Origins of these inclusions are uncertain. Hydrothermal is a likely origin for some of the inclusions. The calcite inclusion can be magmatic in origin.

Table 1. Compositions of inclusions.

	Magnetite MT4	Calcite CC1a	Phlogopite PH2
SiO ₂			35.53
TiO ₂	2.42		2.01
Al ₂ O ₃	0.45	0.02	19.18
FeO + Fe ₂ O ₃	84.04	0.69	5.63
MnO	2.21	0.12	0.12
CaO	0.11	52.06	0.22
MgO	5.84	2.14	23.27
Na ₂ O	0.00	0.10	0.86
K ₂ O	0.01	0.08	9.48
P ₂ O ₅	0.09	0.12	0.16
Total	95.17	55.33	96.46