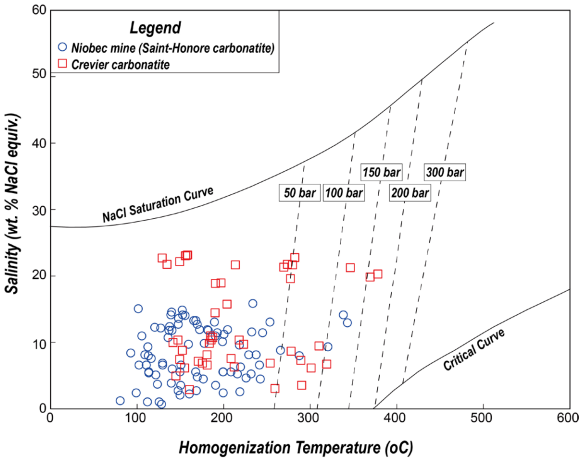
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Fluid Inclusion Microthermometry in Saint-Honoré (Niobec Mine) and Crevier Carbonates, Québec, Canada: Characterization of Hydrothermal Fluids and Paleopressure Constraints

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Carbonatites are well recognized as important hosts for niobium and rare earth element (REE) mineralization, and hydrothermal fluids exsolved from carbonatitic melts are considered to play a critical role in the concentration and redistribution of these economically significant elements [1]. Fluid inclusion microthermometry was conducted on carbonatite samples from the ferro-carbonatite zone of the Saint-Honoré Alkaline Complex (Niobec Mine) and the Crevier Alkaline Complex in Québec, Canada.

Microthermometric analyses of two-phase aqueous (liquid-vapor) fluid inclusions hosted in carbonatite minerals reveal homogenization temperatures ranging from 100 to 400°C, with salinities spanning 0–23 wt. % NaCl equivalent (Fig. 1). Inclusions from the Saint-Honoré carbonatite are characterized by relatively low salinities (0–15 wt. %) and temperatures (100–300°C), forming a well-defined cluster, whereas those from the Crevier carbonatite display a broader salinity range (5–23 wt. %) and more variable homogenization temperatures, suggesting distinct fluid evolution histories between the two carbonatite bodies. All fluid inclusion data plot below the NaCl saturation curve and above the critical curve in the H_2O-NaCl system, consistent with late-stage magmatic-hydrothermal fluids derived from carbonatitic magmas. This interpretation aligns with previous studies suggesting that high-salinity brines in carbonatite systems originate from late-stage magmatic degassing rather than meteoric or metamorphic fluid input [2].

Comparison with isobaric reference curves indicates trapping pressure mainly below 200 bar, consistent with fluid entrapment under shallow to intermediate crustal conditions during the waning stages of hydrothermal activity following carbonatite emplacement. Collectively, the results demonstrate that orthomagmatic hydrothermal fluids played a fundamental role in the late-stage evolution of both carbonatite bodies and provide essential constraints for understanding Nb and REE ore-forming processes in carbonatite complexes.