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In-situ determination of mineral solubilities in fluids using a hydrothermal diamond-anvil cell and SR-XRF: Solubility of AgCl in water

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ABSTRACT

A hydrothermal diamond-anvil cell has been designed for the in situ analysis of the concentration of elements in fluids and melts using synchrotron radiation X-ray fluorescence. This technique permits determination of the solubility of minerals in fluids at high pressures and temperatures (tested to 1.1 GPa and 800 °C). Further advantages include multi-element analytical capability and applicability for sparingly soluble compounds, for congruent or incongruent dissolution, and for studies of dissolution kinetics.

The solubility of AgCl(s) in water was determined at 300 to 450 °C and pressures to 760 MPa. The molality of silver in the fluid was obtained from density corrected Kα peak areas by calibration to the known solubility at 300 °C and vapor pressure and, standardless, by comparison with Monte-Carlo simulated spectra. The results from both methods were internally consistent and in good agreement with literature data for comparable *P-T* conditions.