

## **Hydrolysis of fluorine-rich titanium complex in hydrothermal fluids: implications on mobility and fractionation of the high-field-strength-element in subduction zones**

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It is generally accepted that solubility of rutile, a major host mineral for titanium, governs the activity and cycling of high-field-strength element (HFSE) in subduction zone [1-4]. Because of extremely high solubility of rutile in fluoride-bearing fluids [5], HFSE mobility in fluorine-rich fluids is generally thought to be high [6-7]. However, geochemical behaviors of fluorine-rich HFSE complexes are not clear yet, as metal elements are thought to move in hydrothermal fluids in the form of complex.

A series of hydrolysis experiments under the conditions of 200-800°C and 0.1-2.5 GPa were conducted using synthetic potassium fluotitanate,  $K_2TiF_6$ . In the experimental conditions the Ti complex hydrolyze gradually to form different complex species through ion exchange between  $F^-$  in the fluorides and  $OH^-$  in the  $H_2O$ , and to produce  $TiO_2$  deposit in the acid fluids. Our experimental results show that, i) the cumulative hydrolysis ratio of Ti fluoride complex, which represents the amount of deposit, is enhanced with the pressure and especially the temperature increasing and the initial concentration decreasing. Ti complex hydrolysis is not good to HFSE mobility in fluids; and ii) the deposit changes from anatase phase in the low temperature and pressure to rutile phase in the high temperature and pressure. Ti fluoride complex hydrolysis in fluids can also form rutile due to the change of environmental conditions (eg. increasing P, T or pH).

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