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REE redistribution during the fluid-induced alteration of chevkinite-(Ce): an experimental approach

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The partial alteration of chevkinite-(Ce) in the presence of quartz, albite, and a $\text{Ca}(\text{OH})_2$ -bearing fluid (sealed Pt capsule) has been experimentally achieved at 600 °C and 400 MPa with a duration of 21 days in a standard cold seal autoclave on a high pressure hydrothermal line. After quench, the capsule was opened, dried, and the experimental charge evaluated using BSE imaging and EMP analysis. The chevkinite-(Ce) reacted readily, but variably, the main products being britholite-(Ce) and titanite, with lesser amounts of hedenbergite, wollastonite, and allanite-(Ce) (Fig. 1). Alteration had proceeded along grain rims and along a complex network of cracks in the chevkinite-(Ce) primarily via a coupled dissolution – reprecipitation process. The variable degrees of alteration, the formation of compositionally anomalous rims, and variations in the alteration assemblages are taken to be evidences of local disequilibrium during the reaction between the chevkinite-(Ce) and the fluid. This perhaps was also a product variable metamictization in the original chevkinite, i.e. areas of high metamictization would be more prone to reaction than areas of low metamictization. The somewhat localized formation of allanite-(Ce) appear to reflect regions of high Ca activity in the fluid.

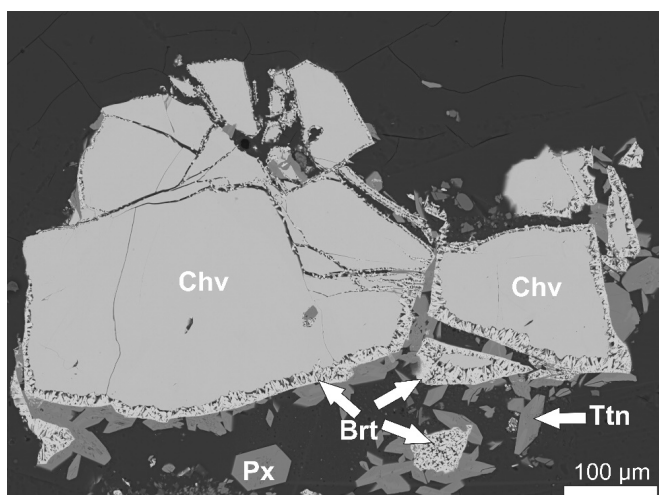


Fig. 1. BSE image of altered pieces of chevkinite-(Ce) (Chv) with pronounced rim of britholite-(Ce) (Brt) followed by titanite (Ttn). Note the unevenness in the alteration of the chevkinite grains.

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