Low Temperature Experimental Investigation of the Effect of High pH KOH Solutions on the Opalinus Shale, Switzerland

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Abstract: Batch reactor experiments were performed at 150 ° C, 175 ° C and 200 ° C to determine the effect of high pH KOH solutions on the mineralogy of the Opalinus shale. In these experiments, the change in solution quench pH at 25 ° C solution composition, and mineralogy were monitored as a function of time for up to ≈50 days. Runs were performed in 50 ml titanium hydrothermal reactor vessels. Each reactor was charged with 0.5 – 5.0 grams of the 80 – 200 mesh size fraction of Opalinus shale, and 25 ml of solution (0.08 and 0.008 m KOH). Under these high pH conditions, the general sequence of reaction products observed is the formation of phillipsite, followed by K-feldspar ± K-rectorite. Phillipsite is a metastable intermediate that eventually transforms to K-feldspar. This sequence of mineral reaction products is very different from that found in the NaOH system.

Key Words: Experimental investigation • High pH • K-rectorite • K-feldspar • Opalinus shale • Phillipsite

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