Dissolution processes of biotite, muscovite and chlorite in a single-pass flow experimental system at low temperatures

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Small flakes (75-250micrometers) of biotite, muscovite and chlorite were held between two filters, through which dilute HCl solutions of pH3 flew (30ml/day) in each dissolution experiment. The reaction cells were kept at 25oC or 40oC during 30 experimental days. The dissolution rates decreased to approach to certain constant values after 10 days. Selective releases of elements were observed: K,Na>Si,Mg,Fe,Al>Ti for biotite, K>Si,Mg>Al for muscovite and Mg>Si,Fe>Al for chlorite (for first 10 days; Mg rates decreased afterwards). The dissolution rates were in the order of biotite>chlorite>muscovite. Powder X-ray diffraction analysis showed no apparent changes before and after the reactions, but altered edges of the flakes were observed by SEM, where secondary minerals were attached.