Dehydration behaviour of muscovite by *in situ* infrared microspectroscopy

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Dehydration of hydrous minerals is one of the important elementary steps in the subduction processes. In this study, dehydration behaviour of muscovite was studied by *in situ* high-temperature IR microspectroscopy by using a heating stage.

Muscovite has an infrared absorption peak around 3620 cm^{-1} due to stretching vibration of Al-OH. Changes with temperature of the OH band and its integral molar absorptivity were first investigated. The peak position of OH in muscovite showed a quasi-linear shift to lower wavenumber from 3627 cm^{-1} at room temperature to 3618 cm^{-1} at 500°C. Peak heights (absorbance) and areas (integral absorbance) were determined after a baseline correction on transmission spectra. Linear and integral molar absorptivities of OH in muscovite at room temperature were calculated by using a molar concentration of OH. Integral molar absorptivities of OH in muscovite decreased quasi-linearly from room temperature to 500°C (about 10% decrease).

Dehydration behavior of muscovite was then investigated at 750-875°C by using the same *in situ* IR microspectroscopy. Isothermal kinetic heating experiments at each temperature gave detailed decrease curves of the OH band area with time. These curves have been simulated by the 1st and 2nd order reactions or diffusion processes, and reaction rate constants, diffusion coefficients and activation energies were determined. Based on these results, dehydration mechnaisms will be qunatitatively discussed.

This novel *in situ* high-temperature IR microspectroscopic technique can be used to study dehydration behaviour of various hydrous minerals.

Hydrous aluminosilicate metasomatism in an intra-oceanic subduction zone: Implications from the Kurancali ultramafic-mafic cumulates within the Alpine Neotethys Ocean, Turkey

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The Kurancali ultramafic-mafic cumulate body, an allochthonous sliver in central Anatolia, is characterized by the presence of abundant hydrous phases as phlogopite and pargasite besides anhydrous phases as augitic diopside and plagioclase with accessory amounts of rutile, sphene, apatite, and calcite. Based on modes of the essential minerals, the olivine-orthopyroxene-free cumulates are grouped into six types as clinopyroxenite, clinopyroxenite with hydrous minerals and plagioclase, phlogopitite, hornblendite, layered gabbro, and diorite. Evidences from petrography and mineral chemistry suggest crystallization from a hydrous magma to form phlogopite with high Fe^{2+}-Fe^{3+}-$Al^{[6]}$-Ti, diopsidic-augite with high Ca-$Al^{(t)}$-Ti, Si-undersaturated pargasite with high $Al^{[4]}$-Ca-K-Na-Ti-contents and intercumulus plagioclase with a wide range of composition (an%=40.61-98.58).

Whole-rock geochemical signatures of the cumulates including clinopyroxenite indicate that this hydrous magma is enriched in K, Rb, Ba, Sr, P, Th, U, and LREE, and depleted in HFSE (Nb, Ta, Zr, Hf, Ti), HREE, and is typical of subduction environment.

Petrographical, mineralogical and geochemical features of the cumulates show that this hydrous magma has high-K calc-alkaline affinity with slightly alkaline character, and infer a metasomatic origin. Our evidences imply that the metasomatizing component, modifying the composition of mantle wedge, is H_2O-, alkali-, carbonate-rich aluminosilicate melt which is likely to be derived from a subducted slab. We suggest that the metasomatic agents in subarc mantle lead to generation of the hydrous magma which produced the Kurancali cumulates in an intra-oceanic subduction zone during closure of the Izmir-Ankara-Erzincan branch of the Alpine Neotethys Ocean.