

WEATHERING OF ILLITE IN ACIDIC CONDITIONS

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Two weathering profiles in the Western Carpathians were studied and set of laboratory experiments were conducted to understand stability of illite crystals during weathering process. Both weathering profiles are developed on neogene hydrothermally altered volcanic rocks. First weathering profile represents weathered mixed layered illite-smectites from Dolná Ves deposit with original expandability of 45%. Pure 2M illite from Hodruša with no expandability was exposed to weathering in the second profile.

Natural acidic conditions were created by the organic matter and dissolution of disseminated fine-grain pyrite. The pH of samples was generally in the interval between 3 and 5. Weathering process is in both cases complex and represents parallel dissolution and precipitation of the new mineral phases. In both cases only a small portion of particles was affected by weathering.

A complete dissolution of a certain number of illite particles took place in the case of Dolná Ves illite-smectite weathering. We did not identified any proof for delamination or opening of illite interlayers. Smectite, kaolinite and illite were identified as the new phases present in the upper profile

samples. Detrital origin of at least part of the illite was determined by K-Ar dating.

On the contrary number of illite interlayers of limited number of Hodruša hydrothermal illite particles were partly opened to create interstratified illite-smectite in the first phase of weathering. Illite-smectite disappeared in the second one (upper profile samples). It was most probably replaced by smectite as a result of completed illite opening. K-Ar ages are close to stratigraphic age which means that detrital input of illite can be excluded.

Set of experiments were conducted to show the role of humic acids in the process of weathering. Natural humic acids extracted from the peat were mixed with the powdered Dolná Ves clay. Both separated fine fraction and bulk clay samples were used for the experiment. Clays and humic acids mixed in different proportions were heated at 60° and 80°C up to 42 weeks. Results show slight alteration of illite-smectite and origin of authigenic phases of discrete illite, smectite and kaolinite. Experiment results were almost identical with naturally weathered samples.