

GEOCHEMISTRY OF ILLITE-SMECTITE FROM BURIED BENTONITES OF THE EAST SLOVAK BASIN

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K-Ar dating, major and trace element chemistry of the illite particles were studied to elucidate the geochemical changes accompanying the illitisation of buried bentonites in the East Slovak Basin. K-Ar dating of different grain-size fractions containing illite crystals, provided that they are free from detrital contamination, could be indicative of the basin thermal and tectonic history as well as of the illite particles growth history. The narrow and old ages for the different grain-size fractions of the buried bentonites in the marginal parts of the East Slovak basin reflect rapid tectonic subsidence and early uplift. The larger range and younger ages for the same fractions were observed in case of the bentonites coming from the central part of the basin. They suggest slow burial and little or no uplift of the area. In bentonites with long-term illitisation process the variations in K-Ar ages could be used to deduce the illitisation mechanism. The onset of the illitisation process was recorded in the uppermost core of the borehole Čičarovce 1 (%S = 90%), giving zero ages. Decreasing ages with decreasing fraction size probably indicate the dominant role of the nucleation and growth mechanism in the early stage of the illitisation process. The opposite trend could be assigned to the dominant role of the surface controlled growth at the final stages of the illitisation. Our

experimental results are in a good agreement with the modelling approach given by Šrodoň (2002).

The negative linear correlation between Al₂O₃ and SiO₂ contents with the illitisation advancement shows the grade of Al substitution for Si in the tetrahedral sheets. The same trend being observed between Al₂O₃ and MgO suggests in turn the substitution in the octahedral sheets. The mobility of V and Sc in the zone of diagenesis seems to be related with the degree of illitisation.

Finally, REE mobilisation and fractionation was clearly documented in samples from the zone of diagenesis. Systematic decrease of total REE content with decreasing clay size fraction indicates that REEs are not fixed in the clay crystal structure. Positive Eu anomaly is always connected with intensive illitisation and REE enrichment. However, the relationship between REEs and illite-smectite crystals is not yet clearly understood.

Reference

ŠRODOŇ, J., CLAUER, N., EBERL, D. D. (2002): Interpretation of K-Ar dates of illitic clays from sedimentary rocks aided by modelling: *American Mineralogist*, **87**, 1528–1535.