

Twelve halloysites from different sources in Slovakia, Turkey, China, New Zealand and U.S.A. have been characterized by combination of analytical methods together with the commercial sample of halloysite supplied by Sigma-Aldrich. The aim of this work was to select suitable candidates for to be used as carriers of porphyrine photoactive molecules. In nature, the formation of halloysite is related to the weathering of magmatic rocks or to the hydrothermal alteration of volcanic rocks, frequently in the contact with limestones.

Halloysite belong to the kaolinite group, but, contrarily to kaolinite, it contains molecules of water in the interlayer space. It occurs in two forms: hydrated halloysite (10 Å) and dehydrated halloysite (7 Å). Dehydrated halloysites contain more admixtures than hydrated ones ? typically kaolinite, quartz, cristobalite, alunite, gibbsite and in one case also potassium mica.

In samples containing both dehydrated halloysite and kaolinite their 001 diffractions overlap. Interaction with formamide was used in these cases to increase the interlayer space of halloysite and thus shift its basal diffraction to lower angles. The basal 001 diffraction of kaolinite after this treatment remains on 7 Å.

Silver thiourea method (AgTU) was used to measure the cationic exchange capacity (CEC).

Silver cations concentrations of in the solution before and after the interaction were determined by atomic absorption spectrometry (AAS). The CEC values depend significantly on the solid/liquid reaction ratio. In case of halloysite this ratio should be at least 1:20.

Two pure hydrated halloysites with the highest CEC values were finally selected to be reacted with porphyrine. The only difference between these two samples was the different width of individual halloysite tubules. It was found that porphyrine not intercalate the interlayer space, but is adsorbed on the outer surface of halloysite ? probably in both exterior and interior of tubules. The interaction changed the color of clay sample to green. The changes were also clearly visible on diffuse absorption and fluorescence emission spectra. The Soret band of porphyrine at 420 nm was shifted after the interaction with halloysite particles 470 nm. These results show that halloysites can be used of carriers of porphyrine molecules.