

Characterising the expanding behaviour of modified organo-bentonite with X-ray diffraction method

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Bentonites primarily composed of montmorillonite sorb cationic contaminants effectively; however they do not adequately sorb organic and anionic contaminants due to their hydrophilic surface properties and negative layer charge [1]. These clays can be modified with organic and/or inorganic cation intercalates, which improves sorption ability of contaminants [2]. In this study, organo-bentonite (OBent) is synthesized by intercalation of organic surfactant, hexadecylpyridinium cation (HDPy) into purified bentonite (PBent) and characterized by X-ray powder diffraction (XRD). The amount of HDPy used for intercalation is 200% CEC of PBent. HDPy is added into PBent suspension and mixed with a mechanical stirrer for about 4.5 h. After this treatment, the solution was filtered and excess anions and organic cations are removed until the conductivity of solution stay constant (35 μ S). XRD patterns of both PBent and OBent are obtained using $K\alpha$ radiation under various conditions. Solvation with water and ethylene glycol (EG) and heat treatments (100, 350 and 550 °C) are applied to both samples. Mixed-layer illite-smectite formation is observed in the PBent sample (investigated with NEWMOD software) suggesting heterogeneity of layer charge of the starting material. Results of XRD analysis supports the notion that HDPy+ intercalated within interlayer and basal spacing increases from 12.19 to 18.84 Å.

[1] Kaufhold, S., Pohlmann-Lortz, M., Dohrmann, R., Nüesch, R. (2007), *Appl Clay Sci*, **35**, 39–46 [2] Atia, A.A. (2008), *Appl Clay Sci*, **41**, 73–84.