New hydrophobic hybrid inorganic and organic particles based on poly(n-hexadecyl-4-vinylpyridinium bromide) adsorption on micron-sized bentonite

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Received 30 March 2013; Accepted 30 December 2013

ABSTRACT

A set of copolymers poly(N-hexadecyl-4-vinylpyridinium bromide) [4VP-C_{16}Br-X] (X = 22, 50 and 78%) obtained by quaternization of poly(4-vinylpyridine) (P4VP) with 1-bromohexadecane (C_{16}H_{33}Br) at various modification percentages was perfectly characterized by conductivity, {\textsuperscript{1}}H NMR, and by thermogravimetric analysis (TGA). New organophilic hybrid materials [BC-4VP-C_{16}Br-X] were obtained from bleaching clay (BC) and [4VP-C_{16}Br-X] copolymers. Indeed, the intercalation of these copolymers in interlayer spaces of the clay introduces new properties such as hydrophobic balance. The interlayer structure of the bentonite receives more or less easily, the polycations [4VP-C_{16}Br-X] in order to increase the interlayer volume in the mineral bentonite, then to give it an organo-phobic character. The characterization of the new composite materials [BC-4VP-C_{16}Br-X] by TGA shows a good stability at high temperature. In order to quantify the hydrophobic nature of the prepared organoclay, these composites were dispersed in aqueous solution in the presence of paranitrophenol (PNP) as indicating agent for the water diffusion into the material. Kinetic measurements of the retained PNP percentages show clearly that water diffusion is directly proportional to the hydrophobic nature of the material. Consequently, more the hydrophobic balance of the composite, less the water diffusion speed.

Keywords: Organoclays; Bentonite; Poly(N-hexadecyl-4-vinylpyridinium bromide); Adsorption; Paranitrophenol (PNP); Kinetics

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