

Sorption of Charged Organic Dyes from Anionic Hydrogels

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Abstract : Hydrogels are three-dimensional, hydrophilic, polymeric networks composed of homopolymers or copolymers and are insoluble in water due to the presence of chemical or physical cross-links. When hydrogels come in contact with aqueous solutions, they can effectively sorb and retain the dissolved substances, depending on the nature of the monomeric units comprising the hydrogel. For this reason, hydrogels have been proposed in several studies as water purification agents. At the present work anionic hydrogels bearing negatively charged $-\text{COO}-$ groups were prepared and investigated. These gels are based on sodium acrylate (ANa), either homopolymerized (poly(sodiumacrylate), PANa) or copolymerized (P(DMAM-co-ANa)) with N,N Dimethylacrylamide (DMAM). The hydrogels were used to extract some model organic dyes from water. It is found that cationic dyes are strongly sorbed and retained by the hydrogels, while sorption of anionic dyes was negligible. In all cases it was found that both maximum sorption capacity and equilibrium binding constant varied from one dye to the other depending on the chemical structure of the dye, the presence of functional chemical groups and the hydrophobic-hydrophilic balance. Finally, the nonionic hydrogel of the homopolymer poly(N,N-dimethylacrylamide), PDMAM, was also used for reasons of comparison.

Keywords : anionic organic hydrogels, sorption, organic dyes, water purification agents

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