ADSORPTION OF CATIONIC POLYACRYLAMIDE ONTO SEPIOLITE

Nalan Tekin¹, Aziz Dinçer², Özkan Demirbaş² and Mahir Alkan²

¹Kocaeli University, Faculty of Science and Literature, Department of Chemistry 41300/Kocaeli/TURKEY
²Balikesir University, Faculty of Science and Literature, Department of Chemistry 10100/Balikesir/TURKEY

Polyacrylamides (PAM) are among the most commonly used polymers in industry¹²³. The adsorption of PAM onto sepiolite from aqueous solutions has been investigated systematically as a function of some parameters such as calcination temperature of sepiolite, pH, ionic strength and temperature. The adsorption of cationic polyacrylamide (PAM) increases with pH from 5.50 to 11.00; temperature from 25 to 55°C and ionic strength from 0 to 0.1 mol L⁻¹. The sepiolite sample calcined at 200°C has a higher adsorption capacity than the other calcined samples. Adsorption isotherms of PAM onto sepiolite have been determined and correlated with common isotherm equations such as Langmuir and Freundlich isotherm models. The Langmuir isotherm model appeared to fit the isotherm data better than the Freundlich isotherm model. The physical properties of this adsorbent are consistent with the parameters obtained from the isotherm equations. The zeta potentials of sepiolite suspensions have been measured in aqueous solutions of NaCl and different PAM concentrations and pH. From the experimental results, (i) pH strongly alters the zeta potential of sepiolite (ii) sepiolite has an isoelectric point at about pH 6.6 in water and about pH 8 in 250 mg L⁻¹ PAM concentration (iii) PAM changes the interface charge from negative to positive for sepiolite. Effect of temperature on adsorption has been quantified by calculating various thermodynamic parameters such as Gibbs free energy, enthalpy and entropy. The dimensionless separation factor (R_L) has shown that sepiolite can be used for adsorption of PAM from aqueous solutions.

References