PREPARATION OF METHACRYLAMIDE GRAFTED AND DYE-LIGAND IMMOBILIZED PET FIBERS: STUDIES OF ADSORPTION AND PURIFICATION OF LYSOZYME

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In this study, novel affinity chromatographic fibers was prepared from methacrylamide grafted poly(ethylene terephthalate), PET-g-pMAA using benzoyl peroxide as an initiator. A dye ligand (i.e., Procion Brown) as a ligand was then covalently immobilized on the different amount of pMAAm grafted PET fibers, (PET-g-pMAAm-PB). The fibers were characterized by surface area measurement, infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and scanning electron microscopy (SEM). Adsorptive properties of the composite fibers were tested using a model protein (i.e., lysozyme). In order to achieve these purposes, the influence of pH, ionic strength, initial lysozyme concentration, and temperature on adsorption system has been investigated and evaluated. A maximum lysozyme adsorption PET-g-pMAAm-PB fiber was obtained as 43.9 mg/g at pH 7.5. The experimental equilibrium data obtained for lysozyme adsorption onto PET-g-pMAAm-PB fibers fitted well to the Langmuir isotherm model. The result of kinetic analyzed for lysozyme adsorption onto affinity fibers showed that the second order rate equation was favorable. The purity of the eluted lysozyme, as determined by HPLC, was 84% with recovery 73% for PET-g-pMAAm-PB fiber. Experiments on regeneration and dynamic adsorption were also performed. It appears that PET-g-pMAAm-PB fibers can be applied for lysozyme separation without causing any denaturation.