Application of polypyrrole coated on perlite zeolite for removal of nitrate from wood and paper factories wastewater

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ABSTRACT

Because of its high solubility, nitrate is considered the most common contaminant of groundwater throughout the world: a contaminant that causes cancer and methemoglobinemia in infants. This research intended to study removal of nitrate from the effluent of the Wood and Paper Factory in Sari with the help of a polypyrrole composite on the natural zeolite perlite. This study, which was carried out under laboratory conditions on the effluent of from the Wood and Paper Factory in Sari, considered the effects of the empirical parameters pH, contact duration, adsorbent dose, and temperature on adsorption. FTIR and SEM were used to identify the structure of the synthesized composites. The optimum conditions for nitrate adsorption by polypyrrole coated on perlite (ppy/perlite) were pH = 5, contact time = 20 min, and adsorbent dose = 0.6 g/100 mL of the effluent. The kinetic data for nitrate adsorption matched the pseudo second-order equation and the Freundlich isotherm, and increases in temperature had a positive effect on removal efficiency. Study of the thermodynamics related to the process indicated that it was a spontaneous and endothermic one. The ppy/perlite composite could be used as an effective adsorbent to remove nitrate from aqueous solutions.

Keywords: Polypyrrole; Perlite; Wood and paper factory effluent; Nitrate

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