Ammonium nitrogen removal from synthetic water by treatment with Tunisian natural clay

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\textbf{ABSTRACT}

The objective of the present study was to investigate the removal of nitrogen in the form of ammonium ions $\text{N}^+\text{NH}_4^-\text{N}$ from aqueous solutions using natural clay. The Tunisian clay from the Beni Ayech area (northeastern of Tunisia) was characterized and used as natural adsorbing materials. The $\text{N}^+\text{NH}_4^-\text{N}$ removal efficiency by clays in a dry state as well as in a liquid colloidal state has been investigated. A series of batch experiments were conducted to ascertain the ability of natural clay (smectite clay) to remove ammonium from synthetic wastewater samples composed of ammonium acetate ($\text{CH}_3\text{CO}_2\text{NH}_4$). The reaction with ammonium was observed to be very rapid, with all the amount of ammonium ions being sorbed in the first 10 min in all instances. Estimated ammonium nitrogen adsorbed was favored by low sorbate concentration, small particle size of sorbent, and an alkaline medium. The sorption kinetics studies strongly indicated that the sorption process was largely governed by interlayer spaces diffusion and that 10 min are sufficient to adsorb a maximum of ammonium. Among the parameters studied are the adsorption isotherms, solution pH, adsorption contact time, and the preconditioning and treatment of rural wastewater by this natural clay.

\textit{Keywords:} Natural clay; Sorption; Ammonium nitrogen removal; Wastewater treatment

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