



## **Adsorption of Ammonium Ion from Ground Water on a Novel Tannin-Formaldehyde Resin Synthesized from Acacia Nilotica Fruit Extract**

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**Abstract:** In this work the performance of a novel tannin-formaldehyde resin synthesized from *Acacia nilotica* fruit extract was evaluated for adsorption of  $\text{NH}_4^+$  ions from ground water. Adsorption of ammonium ions was firstly demonstrated in distilled water solution. The influence of contact time, initial ammonium concentration and the adsorbent dose on the adsorption capability of resin have been investigated. Adsorption isotherm and kinetics were also studied to get insights of the adsorption. Experimental results showed that the current resin can be used as an effective adsorbent for the removal of  $\text{NH}_4^+$  ions from water. The equilibrium kinetic data were found to follow the pseudo-second-order kinetic model. Langmuir isotherm model which gave maximum adsorption capacity (11.4 mg/g) value better fitted to experimental data than Freundlich model. The mean adsorption energy (8.9 kJ/mol) computed from the Dubinin–Radushkevich isotherm fairly suggested the ion exchange mechanism for ammonium adsorption. Results of the resin application for treatment of natural ground water samples (Manfalout and El- Qussiyyah areas, Assiut, Egypt) showed that reducing the ammonium level to minimum and the complete removal depended on the resin dose.

**Keywords:** *Tannin-formaldehyde resin; Adsorption, ammonium; Freundlich, Langmuir, isotherms; Dubinin–Radushkevich; Ground water*

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