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Improvement of Manure Adsorption Capacity for Cobalt Removal by Chemical Treatment with Citric Acid

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Abstract: This paper focuses on how the surface chemical groups of sheep manure affect the adsorption capacity of cobalt ions. Improvement in cobalt ions uptake onto sheep manure was achieved successfully by introducing more carboxylic functional groups into its surface due to citric acid treatment. According to Langmuir model, cobalt ions uptake was increased from 22.88 mg/g for dried sheep manure (D-SM) to 37.45 mg/g when D-SM was treated with 0.6 M citric acid (C-SM). Point of zero charge and cation exchange capacity were determined and found as 4.3 and 82 meq/100g for D-SM while it was found as 3.4 and 281 meq/100g for C-SM, respectively. The effects of process parameters such as solution pH, initial concentration of cobalt ions, contact time and concentration of citric acid on the uptake of cobalt ions were also investigated. Langmuir and Freundlich models were applied to the experimental data. Both models fitted quite well with the experimental data.