

**SYNTHESIS AND CHARACTERIZATION OF MAGNETIC
TITANIUM DIOXIDE NANOPARTICLES, Fe-TiO₂ NPs
FOR ADSORPTION OF LEAD ION**

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ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF MAGNETIC TITANIUM DIOXIDE NANOPARTICLES, Fe-TiO₂ NPs FOR ADSORPTION OF LEAD ION

Titanium dioxide nanoparticles, TiO₂ NPs were synthesized by green synthesis using banana peel extract while magnetic TiO₂ nanoparticles, Fe-TiO₂ NPs were synthesized by a co-precipitation method using FeSO₄.7H₂O. The obtained TiO₂ NPs and Fe-TiO₂ NPs have been characterized using FTIR, XRD and FESEM-EDX. The hydroxyl and carbonyl group present in banana peel extract were responsible for the formation of highly stable TiO₂ NPs in FTIR analysis. The absorption band decreased in Fe-TiO₂ NPs because TiO₂ NPs were reduced when synthesizing Fe-TiO₂ NPs. XRD pattern for both NPs showed a similar result which indicated the formation of anatase phase of titanium dioxide. TiO₂ NPs and Fe-TiO₂ NPs were also characterized by FESEM under electron microscopy with 50 Kx and 80 Kx magnifications respectively. FESEM micrograph of TiO₂ NPs shows a spherical shape bonded to each other while Fe-TiO₂ NPs aggregated with spherical shape particles. The average diameter of Fe-TiO₂ NPs was found to be around 26.08 nm confirming that the synthesized Fe-TiO₂ NPs was in the nanometer range. The adsorption efficiency of heavy metal ion (lead ion) in the adsorption process at various experimental parameters such as pH, initial concentration of Pb(NO₃)₂ solution and adsorbent dosage were investigated. Desorption process of lead ion has been conducted at optimum parameters for different eluents, HCl and CH₃COOH. The extent of adsorption efficiencies and desorption efficiency by Fe-TiO₂ NPs were characterized using AAS. The optimum removal for lead ion was obtained at pH 5, 50 ppm concentration of Pb(NO₃)₂ solution and 0.04 g adsorbent dosage. HCl was the best eluent showed a higher desorption efficiency than CH₃COOH. The application of Fe-TiO₂ NPs was tested at lake water sample in UiTM Kuala Pilah and was found that adsorption process occurred at acidic condition. From the test conducted, the amount of Pb²⁺ ions exceeds the acceptable value standard of 0.05 ppm. The lake water was contaminated with Pb²⁺ ions that will come from various sources.