

Fabrication of Fe₃O₄core-meso SiO₂/TiO₂ Double Shell for Dye Pollution Remediation

Authors : Mohamed Habila, Ahmed Mohamed El-Toni, Mohamed Sheikh Moshab, Abdulrhman Al-Awadi, Zeid AL Othman

Abstract : Water pollution with dyes is a critical environmental issue because off the huge amount of dyes disbarred annually, which cause severe damage for the ecosystem and human life. The main raison for this severs pollution is the rapid industrial development which led to more production of harmful pollutants. on the other hand, the core shell based magnetic materials have showed amazing character for controlling the material synthesis with the targeted structure to enhance the adsorptive removal of pollutants. Herein, the Fe₃O₄core-meso SiO₂/TiO₂ double shell have been prepared for methylene blue dye adsorption. the preparation procedure is controlled to prepare the magnetic core with further coating layers from silica and titania. The prepared Fe₃O₄core-meso SiO₂/TiO₂ double shell showed adsorption capacity for methylene blue removal about 50 mg/g at pH 6 after 80 min contact time form 50 ppm methylene blue solution. The adsorption process of methylene blue onto Fe₃O₄core-meso SiO₂/TiO₂ double shell was well fitted with the pseudo-second-order kinetic model and freundlish isotherm, indicating a quick and multilayer adsorption mechanism.

Keywords : magnetic core, silica shell, titania shell, water treatment, methylene blue, solvo-thermal process, adsorption

Conference Title : ICAMCA 2023 : International Conference on Advances in Materials Chemistry and Applications

Conference Location : New York, United States

Conference Dates : April 24-25, 2023