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The treatment of dye contaminated wastewater using crypto-crystalline magnesite

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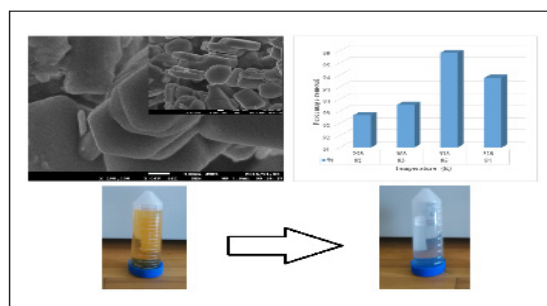
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Discharging industrial colored wastewaters into aqueous environments can cause adverse effects on aquatic life due to the toxic nature of synthetic dyes. The present study aimed to evaluate the efficiency of using crypto-crystalline magnesite to remove an anionic dye (Methyl Orange; MO) from aqueous systems. To achieve that, several operational factors like residence time, adsorbent dosage, species concentration and temperature were appraised. The batch study proved that crypto-crystalline magnesite is effective in the treatment of MO contaminated water and moreover it performed well in terms of color removal. The removal efficiency of crypto-crystalline magnesite was found to be 85.85% for 30 mg/L of MO solution. Four different kinetic models, viz., pseudo-first-order, pseudo-second-order, intra-particle diffusion and Elovich were used to fit the kinetics data. The adsorption kinetics process primarily followed the pseudo-second-order model indicating chemisorption. The best-fitted adsorption isotherm models were found to be in the order Temkin (0.96)>Dubinin Radush Kevich (0.88)>Langmiur (0.81)>Freundlich (0.30). In accordance with the results of this study, it can be concluded that crypto-crystalline magnesite can be used effectively for the adsorption of methyl orange in wastewater and thus can be applied to treat wastewater containing dyes.



Recent Publications

1. Ngulube T, Gumbo J R, Masindi V and Maity A (2017) An update on synthetic dyes adsorption onto clay based minerals: A state-of-art review. *Journal of Environmental Management*; 191: 35-57.
2. Masindi V, Ngulube T and Gitari W M (2015) Kinetics and equilibrium studies for removal of fluoride from underground water using crypto-crystalline magnesite. *Journal of Water Reuse and Desalination*; doi:10.2166/wrd.2015.080.

Biography

Tholiso Ngulube has completed her PhD in Environmental Sciences from the University of Venda in South Africa. She is a Member of the Water Institute of Southern Africa. She has also published articles in international peer reviewed journals and has also attended various international conferences in the environmental sciences field. She has been serving as a Core Lecturer at Applied Centre for Climate and Earth Science Systems (ACCESS) and is also a Tutor and Mentor at the University of Venda.

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