Abstract

The goal of this study is to investigate and develop a cost-effective procedure for the treatment of contaminated water by sorption mechanism using an Omani clay mineral. Attapulgite (Palygorskite) is a clay mineral that exists in the Sultanate of Oman in abundance in two deposits in the southern part of Oman. The attapulgite clay that exist in Shuwaymiyah is selected for study in this project. The X-ray diffraction analysis indicates that the purity of some selected samples of attapulgite clay is very high (about 70% of the clay minerals is palygorskite and 30% Kaolinite). The clay cation exchange capacity is 19.6 mEq/100g and the specific surface area is estimated to be 109.5 m²/g. The main chemical composition of the clay is SiO₂ (53-55%). Batch adsorption studies were performed to evaluate the adsorption performance of methylene blue dye, phenol and naphthalene on Shuwaymiyah attapulgite. The results obtained from these laboratory-scale adsorption tests indicate the strong adsorption capability of the Omani attapulgite in reducing the level of concentration of methylene blue. The attapulgite clay may be quite effective in removing naphthalene at relatively low concentrations from the aqueous medium. There is no significant adsorption of phenol on to the surface of the attapulgite clay.