

# Adsorption capacity and mineralogical and physico-chemical characteristics of Shuwaymiyah palygorskite (Oman)

[Ahmed Al-Futaisi](#), [Ahmad Jamrah](#), [Amer Al-Rawas](#) and [Saif Al-Hanai](#)

## ABSTRACT

In this paper, Shuwaymiyah palygorskite in the Sultanate of Oman has been characterized mineralogically by X-ray diffraction (XRD) and electron microscopy, chemically by oxide compositions, structural formulae, and cation exchange capacity (CEC), and physically by specific surface area and adsorption isotherms. Batch adsorption studies were performed to evaluate the adsorption performance of methylene blue (MB) basic dye on the local clay mineral. The quantitative XRD analysis indicates that the purity of some selected samples of palygorskite clay is very high (about 70% of the clay minerals are palygorskite and 30% kaolinite). The scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images clearly support this conclusion. The adsorption equilibrium revealed that Shuwaymiyah palygorskite clay can uptake up to 51 mg of MB per 1 g mass of clay. MB adsorption is best fitted by Langmuir isotherm, and a pseudo-second-order kinetic model can be efficiently used to predict the kinetic of adsorption of MB by the palygorskite. The results obtained from these laboratory-scale adsorption tests indicate the promising adsorption capability of the Omani palygorskite.