

## Removal of methyl orange dye by manganese/aluminium- layered double hydroxide

### ABSTRACT

As textile production flourishes nowadays, the amount of dyed wastewater entering the water body has also increased. Dyes could have serious negative impacts to the environment and also the human health, hence, they need to be removed from the water body. In this study, layered double hydroxide (LDH) of manganese/aluminium (MnAl) was synthesised to be used as a potential adsorbent to remove methyl orange (MO) dye due to its unique lamellar structure which provides LDH with high anion adsorption and exchange ability. MnAl was synthesized by using co-precipitation method and characterized by powder X-ray diffraction (PXRD), Fourier-Transform Infrared Spectroscopy (FTIR), Inductively coupled plasma atomic emission spectroscopy (ICP-AES) and Carbon, Hydrogen, Nitrogen, Sulphur (CHNS) elemental analysers, and Accelerated Surface Area and Porosity Analyzer (ASAP). Adsorption studies were conducted at different contact times and dosages of MnAl to evaluate the performance of MnAl in removing MO from water. Kinetic and isotherm models were tested using pseudo-first order, pseudo-second order, Langmuir isotherm and Freundlich isotherm. MnAl LDH was found to be perfectly fitted into pseudo-second order and Langmuir isotherm.

**Keyword:** Layered double hydroxide; Methyl orange dye; Adsorption; Pseudo-second order; Langmuir isotherm