



Evaluation of adsorption performance of phenol using non-calcined Mobil composition of matter no. 41 particles

Khairi R. Kalash^{a,*}, Mustafa H. Al-Furaiji^a, Basma I. Waisi^b, Raad A. Ali^a

^aEnvironment and Water Directorate, Ministry of Science and Technology, Baghdad, Iraq, Tel. 009657724042551; emails: khairirs@gmail.com (K.R. Kalash), alfuraiji79@gmail.com (M.H. Al-Furaiji), rakoka2005@yahoo.com (R.A. Ali)

^bDepartment of Chemical Engineering, College of Engineering, University of Baghdad, Baghdad, Iraq, email: basmawaisi@coeng.uobaghdad.edu.iq (B.I. Waisi)

Received 25 December 2019; Accepted 22 April 2020

ABSTRACT

In this research, the adsorption performance of Mobil composition of matter No. 41 (MCM-41) silica-based particles in phenol removal using batch mode operation has been studied. The effect of operating conditions like pH, adsorbent dose, mixing rate and temperature on adsorbent performance was studied. The optimum operating conditions were found to be pH = (4–9), adsorbent dose = 0.4 g, mixing rate = 200 rpm and temperature = 298 K. Phenol removal percentage at the optimal conditions was 67%. Adsorption isotherm studies showed that the Langmuir model was better in describing phenol removal using MCM-41 adsorbent indicating that monolayer adsorption is the dominant mechanism. Kinetics studies were conducted using pseudo-first-order and pseudo-second-order kinetic models. Our results showed that the pseudo-second-order model was better in representing the adsorption of phenol using MCM-41 particles.

Keywords: Adsorption; Phenol removal; MCM-41 particles; Adsorption isotherm; Wastewater treatment; Adsorption kinetics

* Corresponding author.