

PRODUCTION OF ZEOLITE FROM JORDANIAN OIL SHALE ASH AND APPLICATION FOR ZINC REMOVAL FROM WASTEWATER

R. SHAWABKEH*, A. AL-HARAHSEH
A. AL-OTOOM

Department of Chemical Engineering,
Mutah University
AL-Karak 61710, Jordan

Fly ash – a by-product of oil shale processing – was converted into zeolite by alkali hydrothermal activation using sodium hydroxide. Activation was performed at different temperatures using 1, 3 and 8 M sodium hydroxide. The cation-exchange capacity of zeolite obtained showed that the best conditions for synthesis in a closed reactor are: 8 M NaOH solution, 160 °C and reaction time 24 h. The produced zeolite was used as ion exchanger for cleaning wastewater from metal ions. Zinc was chosen as the test metal. The adsorption capacity measured was 89 mg zinc per g zeolite. The results were correlated using Langmuir, Freundlich, and Brunauer–Emmett–Teller isotherm equations, the latter showing a multilayer adsorption. Kinetics of adsorption proved that the rate of adsorption increases with increasing solution pH, temperature, agitation speed and zeolite mass, and decreasing particle size and solution initial concentration.

* Corresponding author: e-mail rshawabk@mutah.edu.jo