Comparative biosorption study of Hg (II) using raw and chemically activated almond shell

Asia A. Taha, Amira HE. Moustafa, Hanaa H. Abdel-Rahman and Mohamed M. A. Abd El-Hameed

Chemistry Department, Faculty of Science, Alexandria University, Alexandria, 21524, Egypt.

MohamedMedhat@alexu.edu.eg

This work presents a comparison between the biosorption of Hg (II) by raw almond shell and activated almond shell. Almond shell based activated carbon has been obtained by physicochemical activation. Batch biosorption results confirmed that, activating condition has a strong influence on the final biosorption process. The biosorbent was characterized using scanning electron microscopy and Fourier transform infrared spectroscopy. To optimize the biosorption conditions pH, adsorbent dose, initial concentration, contact time, stirring speed, and temperature on Hg (II) removal were studied. The optimum conditions for maximum Hg (II) was achieved at 20 and 10 min for raw almond shell and activated almond shell, respectively. The equilibrium data were described well by Langmuir, Freundlich, Dubinin–Radushkevich isotherm models and appling a test of model fitness. Best fit of Langmuir and Freundlich models were found for experimental data, which reveal the homogenous surface of raw almond shell and the heterogeneity of activated almond shell surface. The kinetic data had been divided into either pseudo first order or second order on the basis of the best fit obtained from calculations, confirmed by a test of kinetic validity. An industrial application was examined to improve high biosorption capacity of raw and activated almond shells toward Hg (II).

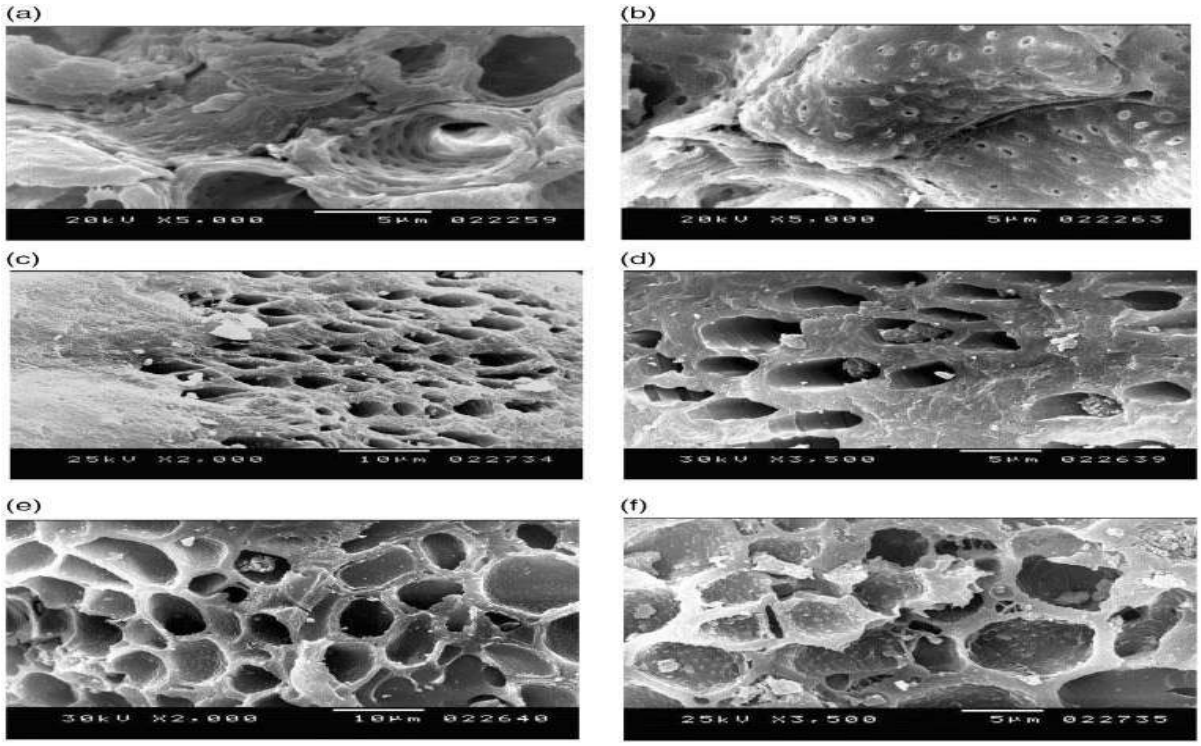


Figure 1: SEM images of RAS: (a) without biosorption, (b) after Hg(II) biosorption: magnification 5000x and for AAS: (c, d) without adsorption, (e, f) after Hg(II) ions adsorption (magnification: 2000x and 3500x).

1. Gonzalez P.G.; Pliego-Cuervo Y. B. Chem Eng. Res. Des. 2014, 92, 2715-2724.
2. Harmayani, K.D.; Anwar, A.H.M.F. *Water Sci. Technol.* 2016, 74, 402-415.