

Study of adsorption characteristics of activated carbon produced by using Coconut shells and Rice hulls

H. Rathnasiri, S. H. S. Dananjaya and M. Edussuriya

Department of Chemistry, University of Ruhuna, Matara, Sri Lanka

Rice hulls and Coconut shells are used as raw materials to prepare activated carbon by chemical activation, as well as by physical activation, using phosphoric acid and steam as activating agents respectively. The effect of process variables such as chemical activation temperature, impregnation ratio (w/w)% between the raw material and phosphoric acid and soaking time, on adsorption of methylene blue was investigated in order to find out the optimum conditions for adsorption. The adsorption capacity of methylene blue on all the activated carbon samples prepared was determined using spectrophotometric method. The activated carbon produced by using coconut shells with soaking temperature of 400°C, impregnation ratio 80% and soaking time of 1 hour, exhibits the best performance towards the methylene blue adsorption among all the coconut shell based carbon samples studied. The activated carbon produced by using rice hulls with soaking temperature of 370 °C, impregnation ratio 100% and soaking time of 30 min, has better performance than the best coconut shell based activated carbon sample, as it gave 2.7 times higher adsorption capacity. Also, this sample has about 1.3 times higher adsorption capacity when compared with the physically activated rice-hull based carbons produced in this study. It was also established that adsorption of oxalic acid on chemically activated rice hull based carbon obeys the Freundlich isotherm.

Key words: *Adsorption, Activated carbon, Chemical activation, Freundlich isotherm, Physical activation*