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Modified LD slag as low cost adsorbent for treatment of phenolic wastewater from steel plant

Amar Nath Samanta, Chayan Sarkar and **Jayanta K Basu**
IIT Kharagpur, India

Water pollution is a very serious environmental issue across the globe. Presence of phenol in water is one of the major reasons for water pollution due to its various harmful effects. Consumption of polluted water, mainly by phenol even at its low concentration is very dangerous to human body. It affects human body severely by causing damages to central nervous system, kidney, liver and pancreas etc. In this work, LD slag, a byproduct of steel making industries, has been modified as low cost adsorbent for removing phenol through adsorption. The modified LD slag has been prepared by acid treatment followed by microwave heating activation. Box Behnken design (BBD) in response surface methodology has been applied to understand the effect of operating variables e.g. acid concentration (0.2-1 N of HCl), microwave radiation time (2-10 minutes) and power (240-1200 W), in the modification of adsorbent for the adsorption of phenol and the effect of microwave radiation time and acid concentration. Optimum conditions of these significant parameters involved in preparation of modified LD slag are obtained through optimization with the help of Design Expert 7.0 software. The adsorbent has been characterized by using XRF technique, BET apparatus and SEM images. The BET surface area of the modified LD slag is obtained as 81.18 m2/g. Batch experiments for the adsorption study have been conducted at different temperatures (30 °C, 40 °C & 50 °C). Langmuir model fits the experimental data with the maximum adsorption uptake of phenol, onto modified LD slag, as 3.4 mg/g and at a pH value of 6. The adsorption kinetics is fitted well to pseudo-second-order model. Thermodynamic analysis proves that the adsorption process is spontaneous in nature and it is an enthalpy driven process (ΔH_0=-4.51 kJ/mol)

amar@che.iitkgp.ernet.in

Quality assessment of groundwater from Avenorfeme, Akatsi district, Ghana

B V Samlafo[1], **L H Bobobee**[1], **E Quarshie**[2], **L A Sarsah**[2] and **E A Kaka**[2]
[1]University of Education-Winneba, Ghana
[2]Ghana Atomic Energy Commission, Ghana

A holistic assessment of the quality of groundwater from the shallow unconfined aquifers of the Avenorfeme and surrounding villages in the Akatsi south district in the Volta region of Ghana has been conducted. A groundwater classification scheme has been developed for groundwater in the area using a robust water quality index (WQI) modified for the case of the study area. For calculating the WQI, pH, sodium, potassium, calcium, magnesium, bicarbonate, chloride, nitrate, sulfate, total dissolved solids, and fluorides have been considered. On the basis of the WQI so computed, groundwater fell within the excellent, good, poor and unsuitable for drinking categories. This study finds that the salinity of groundwater in the area is largely attributed to mineral weathering leading to evolution of predominantly intermediate to high salinity NaCl water types. On account of salinity hazard, most of the waters are not suitable for irrigation in the area. Based on total hardness, the groundwater in the area is permanently hard.

vsamlafo@yahoo.com