Adsorption of phenol on aluminum oxide impregnated fly ash

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ABSTRACT

In this work, the potential of fly ash impregnated with aluminum oxide (FA-Al2O3) for adsorption of phenol from aqueous solution was studied. Batch adsorption experiments were carried out to evaluate the effects of the experimental parameters pH, agitation speed, contact time, adsorbent dosage, and initial concentration on the phenol removal efficiency. The adsorption of phenol by FA-Al2O3 was found to be pH dependent with the best removal achieved at pH 7. The optimum set of parameters for the removal were, 200 rpm agitation speed, 200 mg adsorbent dosage, 2 h contact time, and 2 ppm initial phenol concentration. Both the Langmuir and Freundlich isotherm models represented the adsorption experimental data. However, the Langmuir isotherm model best fitted the data on the adsorption of phenol using FA and FA-Al2O3, with correlation coefficient of 97.7 and 97.9, respectively. The improvement in the adsorption efficiency of FA-Al2O3 over FA could be attributed to the increase in the surface area, which was found to be 11.889 m²/g and 7.1 m²/g for FA-Al2O3 and FA, respectively.

Keywords: Fly ash; Aluminum oxide impregnation; Phenol; Adsorption

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