Adsorption of nickel(ii) ions from aqueous solution using banana peel and coconut shell

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Abstrak

This work investigates the comparative adsorptive removal of Ni (II) ions from aqueous solution using coconut shell and banana peel. Optimum conditions for adsorption were determined by experimental design, while Analysis of Variance (ANOVA) and BonferroniHolm Posthoc significance statistical tests on operational parameters were also conducted. The parametric effect of adsorbate dose, adsorbent dose, pH, contact time, particle size and temperature were varied individually, and their effect on the percentage of Ni (II) ion removal was estimated. The maximum percentage removal was achieved at a pH of 8.0 by both adsorbents. The optimum conditions obtained for both adsorbents were 4.5 g adsorbent dose, 30 min contact time and 25 oC for coconut shell, and 4.5 g adsorbent dose, 120 mins and 25 oC for banana peel. The Langmuir isotherm best described the adsorption, with correlation coefficient (R2) values of 0.9821 and 0.9744 for banana peel and coconut shell respectively. The mean free energy from the Dubinin-Radushkevich isotherm suggested chemisorption, and the adsorption mechanism was found to fit the second order.