

Characterization and nickel ion adsorptive properties using surface modified granular activated carbon

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Activated carbon from coal based was modified with acetates of sodium, potassium and lithium at concentrations of 10 and 15% and used in a batch mode studies to explore the adsorption mechanism of surface modified carbon for heavy metals using nickel as the adsorbate. The physical properties of the carbons are characterized by BET, elemental analysis and chemical interactions with nickel ions as revealed from SEM-EDX, FT-IR and XRD studies. Results show that acetates treatment reduced surface area and pore volume. The Ni(II) ion adsorbed by the resulting adsorption followed the order: LiAC15 > LiAC10 > KA15 > KAC10 \geq NaAC15 > NaAC10 > GAC. The adsorption process depends on pH of the solution with an optimum at 4.5 and follows Langmuir, Freundlich and Sips than Redlich-Peterson isotherm models with maximum adsorption capacity of nickel ion by LiAC15. The chemical surface modification adversely affected the nickel adsorption rate.