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Equilibrium studies for the removal of Fe^{2+} , Ni^{2+} , Pb^{2+} , Cu^{2+} and Zn^{2+} in wastewater on Formaldehyde polymerized peanut test a (*Arachis hypogaea l*) extract

Theresa Uchechukwu
University of Port Harcourt, Nigeria

Formaldehyde crosslinked peanut testa extract was used as an adsorbent to remove Fe^{2+} , Ni^{2+} , Pb^{2+} , Cu^{2+} and Zn^{2+} in wastewater by batch experiments at varying parameter conditions. The efficiencies of the removal processes were found to depend significantly on the pH and temperature of wastewater; initial adsorbate concentration and contact time, less significantly on the amount of adsorbent used but were independent of the stirring speed of the suspension. The removal efficiency of Zn^{2+} increased from 61.2 to 72.1 and to 80.3% at RT, 50 and 60°C respectively. The percentages of Ni^{2+} removed at pH 2, 6 and 8 were: 18.7; 62.7 and 61.9 respectively. The amount of Fe^{2+} removed improved from 21.7 to 78.6 and dropped to 74.2% between the 30th, 120th and 150th minute while 57.4; 46.8 and 33.1 and 57.7; 48.4 and 37.2% of Pb^{2+} were removed at initial concentrations of 10; 20 and 30mg/L respectively. The percentage removal of Fe^{2+} which rose from 65.3 to 71.4 when the adsorbent dose was increased from 2.0 to 4.0g only improved from 78.6 to 78.8 when the amount was raised from 8.0 to 10.0g. When the solutions were stirred at 90; 180 and 210 rpm, 56.6; 57.1 and 57.3% of Pb^{2+} were removed. The equilibrium adsorption data agreed with Langmuir isotherm and pseudo-first-order kinetic models. The study shows that formaldehyde crosslinked peanut testa extract is good for removing Fe^{2+} , Ni^{2+} , Pb^{2+} , Cu^{2+} and Zn^{2+} in wastewater and supports the application of this technique in mitigating the burden of waste disposal.

Keyword: Peanut testa extract, heavy metal ions, adsorption, Langmuir isotherm, pseudo-first-order

Biography:

Theresa Uchechukwu is currently a World Bank research fellow at the African Centre of Excellence in Oilfield Chemicals Research, University of Port Harcourt, Nigeria. She has more than 20years work experience in industry laboratories especially in areas of production chemistry, laboratory operations and administration from the Aluminium Smelter Company, Ikot Abasi, Maylux Industries Nigeria Limited, Nigerian Gas Company (NGC) and West African Glass Industry. Her area of interest is in the development of Ion Exchange Resins from Agricultural wastes for the purification of wastewater. Theresa is a highly focused and diligent person, a great listener with excellent organizational skills.