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Green Adsorbents as a Sustainable Alternative for Water Environments: A Review

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Abstract: *The presence of heavy metal, chromium (VI), in water environments leads to various diseases in humans, such as cancer, lung tumors, and allergies. This review comparatively examines the use of several adsorbents, such as biosorbents, activated carbon, nanocomposites, and polyaniline (PANI), in terms of the operational parameters (initial chromium (VI) concentration (Co), temperature (T), pH, contact time (t), and adsorbent dosage) to achieve the Langmuir's maximum adsorption capacity (qm) for chromium (VI) adsorption. The study finds that the use of biosorbents (fruit bio-composite, fungus, leave, and oak bark char), activated carbons (HCl-treated dry fruit waste, polyethyleneimine (PEI) and potassium hydroxide (KOH) PEI-KOH alkali-treated rice waste-derived biochar, and KOH/hydrochloric acid (HCl) acid/base-treated commercial), iron-based nanocomposites, magnetic manganese-multiwalled carbon nanotubes nano composites, copper-based nanocomposites, graphene oxide functionalized amino acid, and PANI functionalized transition metal are effective in achieving high Langmuir's maximum adsorption capacity (qm) for chromium (VI) adsorption, and that operational parameters such as initial concentration, temperature, pH, contact time, and adsorbent dosage significantly affect the Langmuir's maximum adsorption capacity (qm). Magnetic graphene oxide functionalized amino acid showed the highest experimental and pseudo-second-order kinetic model equilibrium adsorption capacities.*

Keywords: Biosorbent, Graphene, Nanocomposite

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