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Synthesis of Chitosan-g-Biomass Ash/Graphene Oxide Nanocomposite for the Removal of Copper and Chromium from Industrial Waste Water

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Abstract–Biomass ash (BA) obtained as a byproduct from biomass feedstock shows adsorption capacity for heavy metals and could be economical and environment friendly adsorbent. Chitosan (Cs) and Graphene oxide (GO) are efficient adsorbent for removal of dyes, metal ions and toxic compounds. When biomass ash is used as nanocomposite formation along with Chitosan and Graphene Oxide then its adsorption capacity is enhanced. In the present work, Chitosan grafted Biomass ash on Graphene oxide base nanocomposite adsorbent (Cs-g-BA/GO) is synthesized for the effective removal of Cu (II) and Cr (VI) metal ions present in industrial waste water. They were characterized by FTIR, UV, FESEM and adsorption was studied by employing AAS with variables like pH, Adsorbent dose and contact time. The results showed that Cs-g-BA/GO nanocomposite is an efficient adsorbent with 69.5 % for Cu(II) and 74.7 % for Cr (VI) at pH 4.5 and 5 respectively. The optimum adsorbent dose was 0.12 g l⁻¹ at pH 5 with removal efficiency was 80.0 % and 82.6 % for Cu (II) and Cr (VI) respectively at a contact time of 90 min. Chitosan-g-Biomass ash/ Graphene oxide nanocomposite was significant adsorbent for the removal of Cu(II) and Cr(VI) metal ions present in waste water.

Keywords: Adsorption, Decontamination, Grafting, Heavy metal, Industrial affluent.