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Adsorption of Zn(II) ions by chitosan coated diatomaceous earth

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Abstract

In this work, chitosan coated diatomaceous earth (CCDE) beads were synthesized by a drop-wise method and characterized by FTIR, BET, SEM, EDS, and zeta potential for Zn(II) ion removal from aqueous solution in batch and continuous processes. Several parameters have been studied such as solution-pH, initial Zn(II) ion concentration, temperature, flow rate, and contact time to investigate the Zn(II) ion uptake. The maximum adsorption capacity of Zn(II) ion onto CCDE beads was 127.4 mg/g in batch studies. The adsorption followed Pseudo second order and was well fitted to Langmuir model, indicating monolayer adsorption behavior. The continuous adsorption studies showed decreasing breakthrough and exhausted time with increasing flow rate of solution. The breakthrough points were 220 and 115 min at flow rate 3 and 6 mL/min, respectively. Loaded CCDE beads with Zn(II) ions were successfully regenerated by 0.2M NaOH without damaging the adsorbents and up to 87 % recovery in the fourth cycle. Anions in the solution had an insignificant effect on Zn(II) ion uptake by CCDE beads. Overall results suggested that the prepared adsorbents could be

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