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Kinetics, equilibrium modeling, and thermodynamics on removal of Cr(VI) ions from aqueous solution using novel composites with strong base anion exchanger microspheres embedded into chitosan/poly(vinyl amine) cryogels

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Abstract: Efficient removal of hexavalent chromium Cr(VI) is a stringent issue which requires efficient and, preferable, reusable sorbents. In this context, novel composite sorbents were designed in this work consisting of a combination between the chitosan (CS) and a synthetic polycation, poly(vinyl amine) (PVAm), in a ratio of 80:20, w/w, dual-cross-linked with glutaraldehyde (GA) and ethylene glycol diglycidyl ether (EGDGE), in which the microspheres of some porous strong base anion exchangers (IEx) having (vinylbenzyl diethyl 2-hydroxyethyl)ammonium chloride functional groups, and sizes in the range 90-200 μm, were evenly dispersed. Macroporous CS/PVAm/IEx composites as cryobeads or monoliths were applied to the sorption of Cr(VI) from synthetic aqueous solutions, in batch mode. The results revealed that the sorption of Cr(VI) oxyanions was high in the range of pH 3 - 6, and abruptly