Sorption mechanism of heavy metal ions on aminofunctionalized macroporous copolymers based on glycidyl methacrylate and ethylene glycol dimethacrylate

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Cross-linked macroporous copolymers based on glycidyl methacrylate and ethylene glycol dimethacrylate, referred to as PGME, are highly intriguing materials with a well-developed active surface. They are synthesized in the form of spherical microparticles through an in situ free-radical copolymerization reaction. The presence of epoxy rings in their chemical structure makes these polymers ideal starting materials as they enable the incorporation of various functional groups (ligands) and customization for specific sorbent applications. Aminofunctionalized PGME has demonstrated a pronounced affinity for heavy metal ions. Sorption studies in aqueous solutions, encompassing a wide range of metal cations and oxyanions commonly found as pollutants in wastewater (Cr(VI), Co(II), Ni(II), Fe(II), Mn(II), Cd(II), Pb(II), Cr(III)), have consistently showcased the high efficiency of these sorbents [1, 2]. Numerous studies on the kinetics, equilibrium, and thermodynamics of the sorption process of amino-functionalized PGME-deta have been conducted to elucidate the influence of relevant system parameters on sorption capacity. Additionally, molecular modeling methods (theoretical quantum chemical calculations) have been incorporated into the analysis of experimental data to develop a theoretical model applicable in systems with well-defined parameters, facilitating the theoretical prediction of sorbent efficiency and selectivity towards different ionic species in aqueous solutions [3-6].

Keywords: macroporous copolymers, sorption, heavy metal ions

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