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Matej Šuránek (Poster 5)

Recent advances and future perspectives on adsorbents in removal of polyphosphonates

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Widely used in various industrial applications such as water treatment, detergents, and corrosion inhibitors, polyphosphonates pose significant environmental challenges, particularly in water bodies, due to their strong chelating ability and resistance to biodegradation. Conventional water treatment methods often fall short in effectively removing these compounds, necessitating the development of more advanced and efficient technologies. Adsorption has emerged as a promising technique for the removal of polyphosphonates, given its high efficiency, versatility, and potential for regeneration [1,2].

Recent advances in adsorbent materials have significantly improved adsorption capacity, selectivity, and reusability in the removal of polyphosphonates. Novel materials, such as modified activated carbons, metal-organic frameworks (MOFs), biochar, and nanocomposites, have demonstrated remarkable performance in capturing polyphosphonates from aqueous solutions. The functionalization of adsorbents with various chemical groups, such as amines, thiols, and carboxylates, has further increased their affinity for polyphosphonates, enabling more efficient removal processes [3,4].

Furthermore, recent studies have focused on optimizing adsorption conditions, such as pH, temperature, and contact time, to maximize the removal efficiency. The integration of adsorption with other treatment processes, such as membrane filtration and advanced oxidation, has also been explored to increase the overall treatment efficiency. However, challenges such as the high cost of advanced adsorbents, potential secondary pollution, and the need for regeneration methods remain areas of concern [4].

The development of cost-effective, environmentally friendly, and easily regenerable adsorbents is crucial for the sustainable removal of polyphosphonates. The integration of machine learning and computational modeling in the design of new adsorbents offers promising future directions. Continued research in this field will be pivotal in addressing the global challenge of polyphosphonate pollution in water systems.

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