

Activated Soda-Lime Glass - A Novel Material for Wastewater Application

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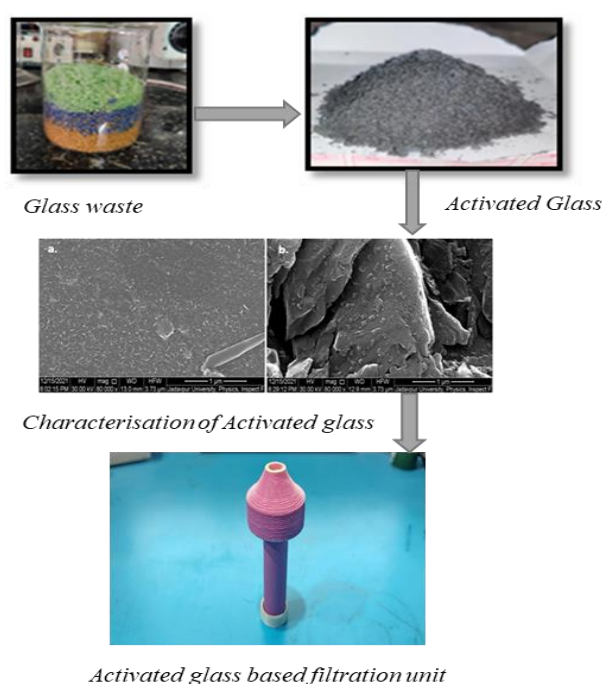
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Graphical Abstract



Abstract

Recycling of materials has been one of the extensively followed pathways for solid waste management and achieving sustainability, which has become one of the crucial areas of research emphasizing environmental protection and water remediation issue. Owing to high ion exchangeability, previous works on porous glass structures for developing low-cost adsorbents have been widely carried out.²⁻³ This work involves the activation process of Soda Lime Glass, with excellent adsorption capacities as filter media, prepared using a simple three-step reaction. Characterization of the novel adsorbent has been done using Fourier-transform infrared spectroscopy. Batch experiments were performed to quantify the adsorption kinetics and adsorption capacities of the activated Glass, performance of the synthesized composite was evaluated for the adsorption of As (V), Fe (II), Cd (II), Pb (II). The Activated Glass exhibited high dye removal capacity of 185.2 mg/g. The sorption data perfectly fitted the Langmuir adsorption isotherms models for all the studied metal ions. The selectivity sequence according to the maximum adsorption capacities can be given Fe(II)>Pb(II)>Cd(II)>As(II). The good performance of the activated glass can be attributed to the ordering of the silicate structure, the Na⁺ and Ca²⁺ in the modifier network, and the Fe-O doping in the modifier network, which shows excellent ion exchangeability

properties. These appropriate features will contribute to the reuse of this novel waste glass as sorbent material in practical application for the removal of heavy metals from industrial wastewater. Results have illustrated the high potential of the newly synthesized Activated Glass for groundwater and wastewater treatment purposes.

Keywords: Adsorbent, heavy metal removal, glass composite, wastewater treatment, waste glass.

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Biography of Presenting Author



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