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Review

Insight into metal-impregnated biomass based activated carbon for enhanced carbon dioxide adsorption: A review

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ABSTRACT

Recently, biomass has been understood and investigated to develop adsorbents for carbon dioxide (CO₂) adsorption due to their non-hazardous nature, availability, low disposal cost, and thermal stability. In this perspective, the sustainable approach of converting biomass into activated carbon (BAC) for the adsorption of CO₂ is promising for solid waste management while reducing anthropogenic greenhouse gas emissions. Among other biomass adsorbents, metal oxide impregnated activated carbon (MBAC) has demonstrated excellent adsorption affinity for CO₂ adsorption. Therefore, in this review, an evaluation and detailed study of various MBACs for CO₂ adsorption is presented for the first time. BAC synthesizes method, including various carbonization techniques, surface activation and functionality approaches have been discussed. This study also provides detailed overview of MBAC in the context of various preparation methods, critical factors and operating parameters for a high CO₂ adsorption capacity. Besides, the solid-gas reactor configuration, cyclic regeneration techniques, CO₂ adsorption process mechanism, and CO₂ adsorption kinetics also have been discussed. Finally, concluding remarks and future perspectives for biomass-derived MBAC for CO₂ adsorption capture were addressed. This review will also assist in the search for alternatives to CO₂ adsorption technology, which is both cost-effective and environmentally friendly.

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