Developments in activated functionalized carbons and their applications in water decontamination: a review

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Received 8 September 2013; Accepted 2 January 2014

ABSTRACT

Extremely high surface area, porosity, and other surface properties make activated carbons (ACs) a versatile and universally acclaimed adsorbent. High production costs limit the use of ACs as adsorbents, and this is a major driver for worldwide research targeting cheap precursors to reduce the production cost and to enhance the adsorption efficiency. This review highlights the preparation of ACs from various precursors, their functionalization, characterization, and their applications in water decontamination. A list of cost-effective precursors derived from agricultural waste materials along with the pollutants removed is presented. ACs can be functionally modified to develop highly efficient and adsorbate selective materials. Enhancement of the adsorption efficiency of ACs for inorganic pollutants and metal ions can be achieved by chemical modification, while physical modification of ACs via thermal treatment can enhance the pore size and surface area. A summary of the various chemical, physical, and biological processes that are utilized for these modifications is presented.

Keywords: Activated carbon; Preparation; Functionalization; Characterization; Water decontamination

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