

Preparation of activated carbons from MDF and PB for application in environmental protection

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Activated carbons are extensively used in many fields as efficient and versatile adsorbents. Thanks to their highly developed porous structure and large specific surface area, they exhibit a considerable adsorption capacity towards various pollutants, both organic and inorganic compounds, in liquid or gaseous phases [1]. The beneficial use of agrochemicals in modern agriculture is undeniable. However, pesticides and herbicides have been responsible for strong environmental impacts, mainly due to their persistence in the environment. Considering the widespread use of pesticides, more efforts should be directed to investigate the removal of pesticide residues from drinking water and wastewater. In Portugal, permitted levels in drinking water have been decreased to only 0.1 µg/L for one pesticide or to 0.5 µg/L for all [2].

In this work, the removal of 2,4-dichlorophenoxyacetic acid (2,4-D) and 4-chloro-2-methylphenoxyacetic acid (MCPA), two of the most commonly used phenoxy acid herbicides, from aqueous solution was studied by using activated carbon (AC), prepared from MDF and PB composites, as adsorbents in a batch system. The AC prepared from such diverse materials have a large range of structural and chemical properties. We would like to highlight that the use of wood composites in the production of AC has not yet been explored to its full potential.

The AC were prepared by physical and chemical activation with CO₂ and KOH, respectively, at different temperatures. All samples were characterised by N₂ adsorption at 77 K, X-ray diffraction, elemental analysis, FTIR and determination of the point of zero charge. The AC obtained retain the shape of the initial precursor and present type I isotherms, corresponding essentially to a microporous structure.

Selected AC were tested for 2,4 D and MCPA removal from the liquid phase. The results obtained show that AC prepared from MDF and PB can be used as an adsorbent for the removal of phenoxyacetic pesticides from aqueous solutions.

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