FACILE FUNCTIONALIZATION OF CHARCOAL IN WATER SOLUTION

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Key Words: Charcoal, functionalization; Cationic exchange; Surface modification

Charcoal is a renewable resource, low-cost, and environmentally friendly material resulting from the carbonization of wood or plants by heat in the absence of air at a temperature above 300 °C. It has become a popular material in recent years due to its potential applications in environmental remediation, agriculture, water filtration, and energy production. [1,2]

Chemical functionalization involves the modification of charcoal's surface properties by introducing functional groups or molecules onto its surface. Various chemical agents have been used, including acids, bases, oxidants, and amines. For example, the treatment of charcoal with strong acids, such as sulfuric acid, nitric acid, and hydrochloric acid, can introduce carboxylic and phenolic groups onto the surface of the charcoal. These functional groups can enhance the hydrophilicity of charcoal and increase its adsorption capacity for pollutants.[3] Several articles have recently reported on the ability of Charcoal to substitute less environmentally friendly carbon fillers, such as in epoxy resins, to improve electrical conductivity[4] and mechanical properties or in PLA biocomposites whose properties[5] can be modulated by selecting the content of carbon filler to govern the morphology as well as the rheological and mechanical behavior.[6]

In our study, we used Dodecyltriphenylphosphonium salt (DTPP) as a cationic compound to functionalize the surface of charcoal in solution. The cationic nature of these reagents enables them to attach to the surface of charcoal through electrostatic interactions, forming a positively charged layer on the surface.

The chemical functionalization of charcoal with DTPP has shown promising results in enhancing its functionality for various applications. However, the choice of functionalization method depends on the specific application and the desired surface properties of charcoal. Although chemical functionalization may require the use of hazardous chemicals and generate waste, this functionalization procedure represents a greener and easier approach to chemical modification. Therefore, further research is needed to optimize the functionalization methods and explore their potential for practical applications as versatile and sustainable materials.

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