

ACTIVATED CARBON FROM FOXTAIL PALM FRUIT FOR REMOVAL OF METHYLENE BLUE, Cr(IV) AND METAMIFOP

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Highlights: The activated carbon was prepared using foxtail palm fruit which activated by nitric acid (HNO₃) carbonized at 500°C for 2.5 hours in a furnace. The produced activated carbon was then treated for various types of pollutants. In this study, the pollutants were methylene blue, chromium and metamifop. The activated carbon were able to give high percentage removal due to well-developed pores resulted from evaporation of chemical reagent which was nitric acid during carbonization that leaving empty space on the surface.

Key words: adsorption, activated carbon, foxtail palm fruit, methylene blue, Cr, metamifop

Introduction

Many activated carbon derived from agro-waste have been proposed since the use of commercially available activated carbon is costly. Therefore, the production of activated carbon from agro-waste would be a better option as it is less expensive and environmental friendly. Activated carbon can be produced from any type of carbonaceous materials or agro-waste such as coconut shell, orange peels, rice husk and many more. It has been reported that all activated carbons prepared from agro-waste capable in removing heavy metals, reducing dye pollutant from aqueous solutions and many more. A good activated carbon will be produced from agricultural waste which contained high carbon content, stability of supply in the countries, higher potential extend of activation and inexpensive materials such as the foxtail palm fruit. Due to this, activated carbon prepared from agro-waste is conducted. The agro-waste that will be used is *Wodyetia bifurcata* or known as Foxtail palm. It is a species of palm in the Arecaceae family where popularly planted in Malaysia and around the world as a landscape plant. Foxtail palm tree produce flowers and bunches of fruits that contain seeds. The foxtail fruits do not have any specific usage and always being left until rot.

Content

Preparation of Activated Carbon: Foxtail palm fruits were collected around Jeli, Kelantan, Malaysia. The foxtail palm tree and the fruits were shown in Fig. 1. The fruits were washed several time with distilled water as to remove surface impurities and then dried in an oven at 100 °C overnight. The dried fruits were hard to crush, hence, need to be carbonized at 300 °C. The carbonization was conducted for two hours in order to get the char samples and allowed to cool in that furnace for three hours. Next, the char samples were crushed using miller blender, sieved to pass through 250 μm and kept stored in desiccator for further chemical activation process. The prepared char was weighed about 40 g and added to the conical flask containing 80 ml of concentrated HNO₃. The mixture was mixed vigorously for 30 minutes until became paste with constant stirring for homogeneity and left overnight for impregnation. After that, the sample was carbonized for 2.5 hours in furnace with temperature of 500 °C. Finally, the produced activated carbons were rinsed with distilled water until the distillate was pH7. The carbon samples were dried at 150 °C for 3 hours in the oven and kept in air tight container prior using for dye removal process.



Figure 1: The activated carbon from foxtail palm fruit that applied in adsorbing various types of pollutants such as herbiced, dye and heavy metals