

ACTIVATED CARBON PRODUCTION FROM OIL PALM WASTE AND BY-PRODUCT - PILOT PLANT STUDY

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INTRODUCTION

Oil palm wastes such as palm shells and empty bunches, the by-products of milling process, can be turned into value added product such as activated charcoals. The conversion of these materials will directly solve some of the disposal problems. In addition, it will increase the output of oil palm industry by turning a by-product into a resource for other related industry.

PRODUCTION PRINCIPLES

Activated carbon can be manufactured by using two main techniques, namely the chemical and physical methods (Figures 1a and 1b).

Physical method is carried out in two consecutive steps that is carbonization of the raw material to the intermediate char at a temperature of 300°C- 500°C, then followed by activation process at a temperature 800°C-900°C using steam or carbon dioxide gas.

In the chemical method, the raw materials are impregnated with an activating agent solution such as zinc chloride, phosphoric acid, etc. After drying, the mixture is carbonized at 100°C-700°C. The finished char is washed and dried before used.

PILOT PLANT DESCRIPTION

The pilot plant (Figure 2) which was built and tested at UTM can produce activated carbon by both methods. The yield of the activated carbon is 30%-35% of the raw feed by weight. A diesel burner is used to supply heat to the furnace whereas steam is supplied by a boiler.

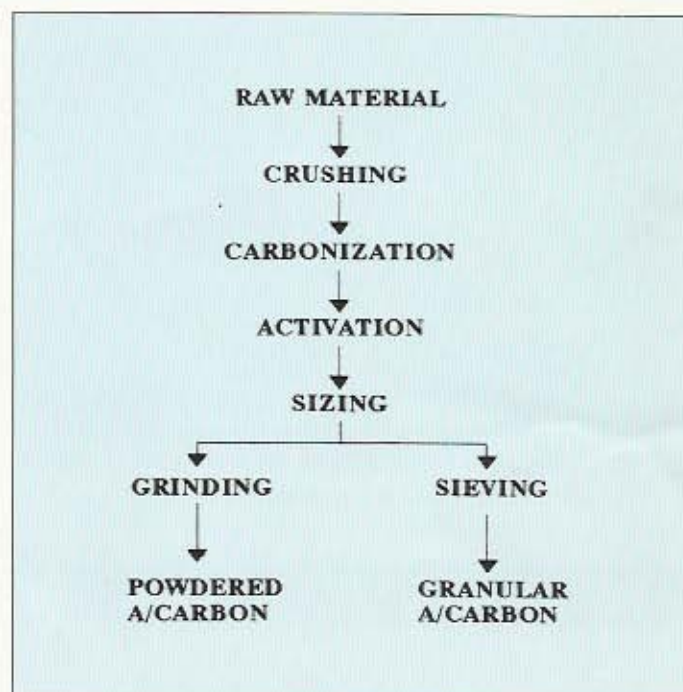


Figure 1a. Physical Method

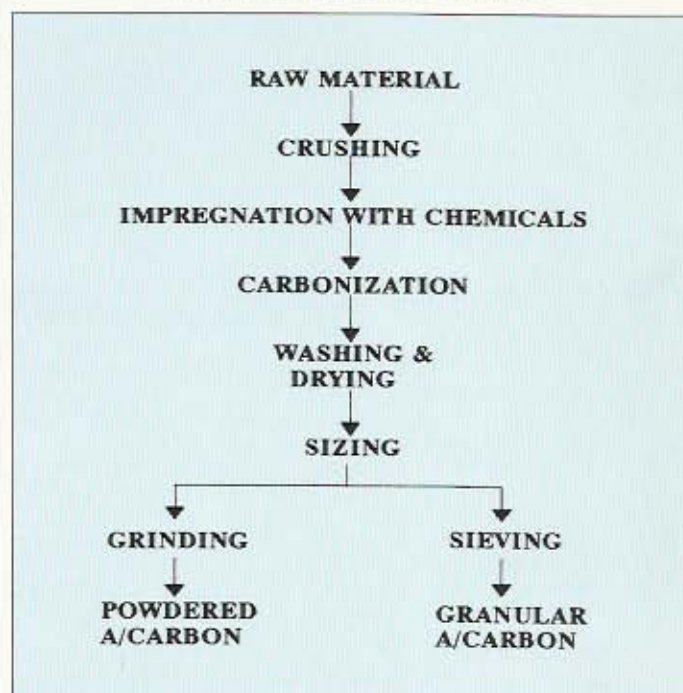


Figure 1b. Chemical Method



SURFACE AREA OF ACTIVATED CARBON PRODUCED

The surface area of activated carbon obtained is dependent on the process parameters and the raw materials itself. However activated carbon obtained by chemical method usually have a higher surface area compared to the activated carbon produced by physical method. Preliminary results showed that, activated carbon produced by the pilot plant have a higher surface area when compared to the laboratory scale facilities using a same percentage of impregnation.

ECONOMIC FEASIBILITY

The prospect of commercialization is promising if the production cost can be lowered. This can be done by using a continuous activation process with a larger production capacity.

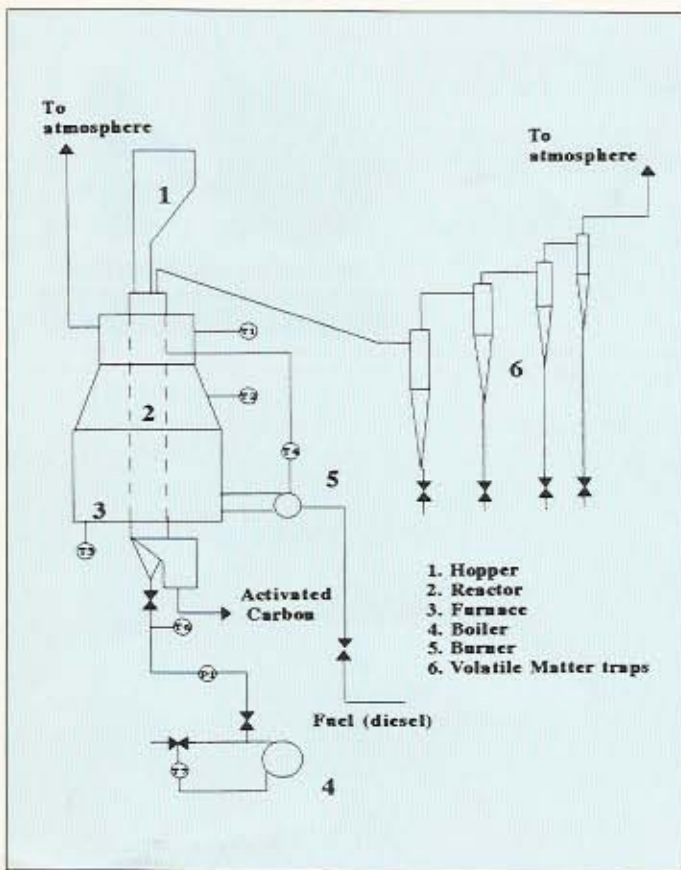


Figure 2. Schematic Diagram of Activated Carbon Pilot Plant in UTM



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