

AN ABSTRACT OF A THESIS

A LABORATORY SCREENING STUDY OF THE PRODUCTION OF ACTIVATED CHARCOAL FROM CROP WASTES USING FERTILIZER MATERIAL

Pei-Yuan Yang

Master of Science in Chemical Engineering

The objective of this study was to determine iodine number and yield of activated charcoal produced from pecan shells, walnut shells, and corncob grits using 85 weight percent o-phosphoric acid as the activating reagent. In this study, the chemical activation method was used.

The iodine number and yield were determined at different values of impregnation ratios, activation temperatures, and soaking temperatures. Impregnation ratios were 0, 25, 100, 200, and 300 percent. The activation temperatures were 600, 700, and 800 °C. The soaking temperatures were 110 °C and 200 °C.

Analysis of the results showed that for the three raw materials at an activation temperature of 600 °C and a soaking temperature of 110 °C, the iodine number increased as the impregnation ratio increased from 0 percent to 200 percent and the iodine number increased significantly when the impregnation ratio changed from 25 percent to 100 percent. The yield did not differ greatly as the impregnation ratio increased from 25 percent to 200 percent. However, the yield increased significantly when the impregnation ratio changed from 0 percent to 25 percent. For an impregnation ratio of 200 percent and a soaking temperature of 110 °C, iodine number increased significantly as activation temperature changed from 600 °C to 800 °C, and the increase was roughly the same for the three raw materials. The corresponding yields decreased significantly for the three raw materials as activation temperature changed from 600 °C to 800 °C, but this decrease was roughly the same for the three raw materials. For the corncob grits, it showed that soaking temperature strongly affects both iodine number and yield. When the soaking temperature was changed from 110 °C to 200 °C, iodine numbers in excess to 1000 mg/g were obtained, but the yield decreased to only 28 percent.

A LABORATORY SCREENING STUDY OF THE PRODUCTION
OF ACTIVATED CHARCOAL FROM CROP WASTES
USING FERTILIZER MATERIAL

A Thesis
Presented to
the Faculty of the Graduate School
Tennessee Technological University
by
Pei-Yuan Yang

In Partial Fulfillment
of the Requirements for the Degree
MASTER OF SCIENCE
Chemical Engineering

May 1990

CERTIFICATE OF APPROVAL OF THESIS

A LABORATORY SCREENING STUDY OF THE PRODUCTION
OF ACTIVATED CHARCOAL FROM CROP WASTES
USING FERTILIZER MATERIAL

by

Pei-Yuan Yang

Graduate Advisory Committee:

Clayton P. Kew April 20, 1990
Chairperson date

W.D. Hall April 20, 1990
Member date

Ken L. Purdy 4-23-90
Member date

Approved for the Faculty:

Robert J. Smith
Dean, Graduate School

5/2/90
Date