

ENCLOSURE (B) 4

STUDIES ON THE HYDROLYSIS
OF PINE WOOD

by

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SUMMARY

Laboratory tests of the hydrolysis of pine wood by the Bergius process using conc. HCl were repeated, and a pilot plant was erected for continuous operation treating 12 kilograms of wood per day. This pilot plant, however, was never operated.

I. INTRODUCTION

This research was started in January, 1945, to obtain fermentable sugar from pine wood. (Complete data not available.)

It was mainly carried out by Eng. Lieut. M. MURAKAMI.

II. DESCRIPTION

A. Chipped pine wood was immersed in concentrated hydrochloric acid (40%) and allowed to stand at room temperature. The optical rotatory power and reducing power of the solution was measured during reaction. After one hour, almost all of the celluloses in the wood were hydrolyzed to acid cellulose, and after 24 hours the hydrolysis reached equilibrium. About 80% of the total sugar was inverted to glucose.

B. The chemical stability of glucose towards HCl in the solution was studied, because it is important in deciding the maximum temperature for recovering hydrochloric acid from the hydrolyzed liquor by distillation. Glucose is easily polymerized to higher polymers by conc. HCl, but if the temperature of distillation is kept below 50°C., more than 90% is reinverted to glucose by boiling with dilute HCl.

C. Recovery of HCl by vacuum distillation from hydrolyzed liquor was investigated and 90% of the acid was recovered. The concentration of distilled HCl was 32% and the concentration of HCl remaining in the residual sugar solution was 5%.

D. Fermentation Test. The residual sugar solution from the distillation was neutralized by PbCO_3 , diluted to a 7% sugar solution. The solution was subjected to fermentation test after inversion. Eighty percent of the total sugar was converted to ethyl-alcohol (3.96% of the original wood).

E. The separation of the acetic acid included in the distilled HCl solution was studied using a U-tube type separator, and it was separated into two components, 95% of HCl and 90% of acetic-acid in purity, respectively.

F. A pilot plant treating 12 kilograms of wood per day was erected in order to test continuous operation but it was not used. (See Figure 2(B)4.)

The flow chart and operating conditions of the pilot plant are shown in Figure 1(B)4.

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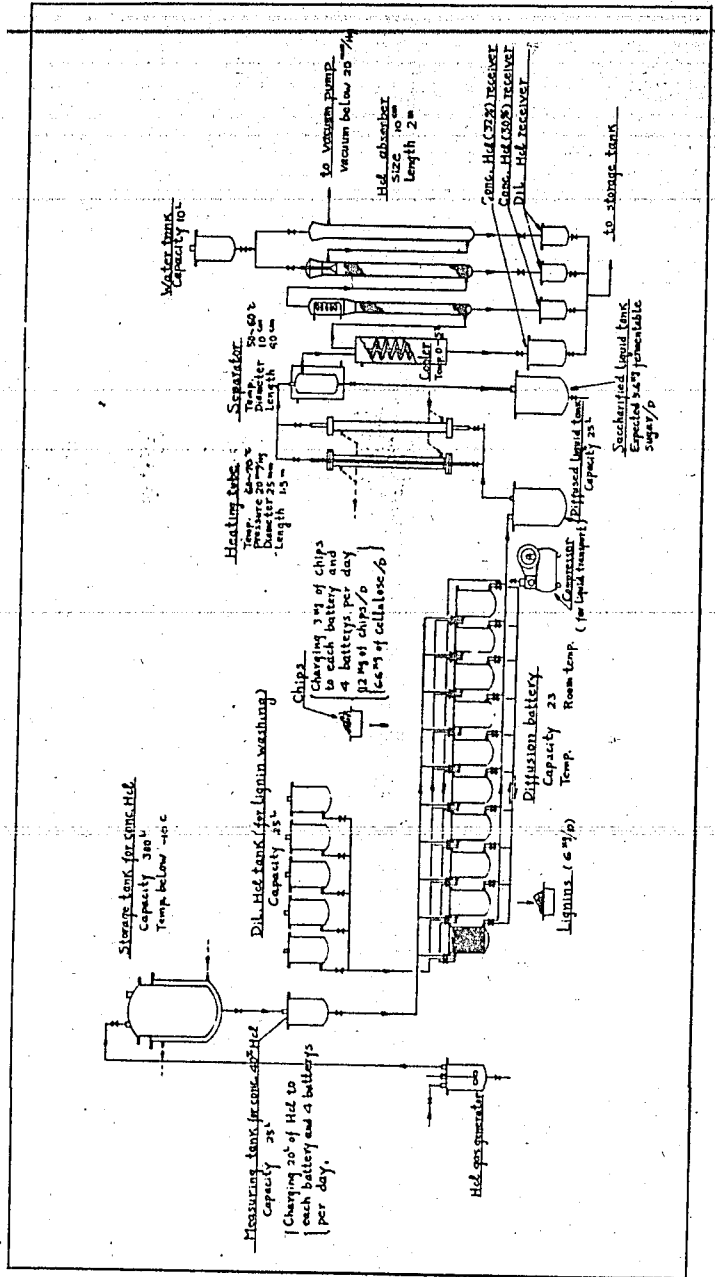


Figure 1 (B)4
APPARATUS OF WOOD SACCHARIFICATION

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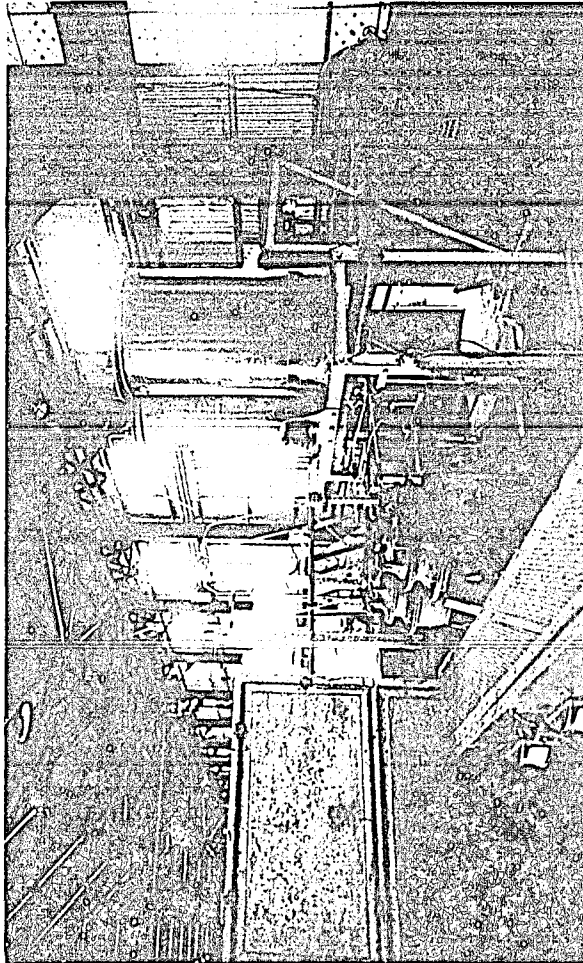


Figure 2 (B)4
PILOT PLANT FOR HYDROLYSIS OF WOODS