

PRODUCTION, CHARACTERIZATION, AND
APPLICATIONS OF ACTIVATED CARBON

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ABSTRACT

This thesis investigates the production of activated carbon, an environmentally friendly adsorbent which is used in many industries. Activated carbon can be derived from many different sources and produced in varying production processes. The raw materials used, activation process, and process parameters determine the physical properties and performance characteristics of the resulting carbon. Modifying these activation properties determines the porosity and pore volume distribution in the carbon. In preparation for commercial production, detailed mass balances are needed to quantify yield, quantify the masses of waste streams, understand the propensity to recycle the KOH, and to provide a benchmark for further optimization. A mass balance on the reaction of phosphoric acid and KOH with carbon is provided. Additionally, analyzing carbons can be expensive and time consuming, making it important to identify physical properties which indicate that a carbon may have favorable performance characteristics. The following paper proposes three ways of screening carbons: observing the mass loss in the chemical activation process, measuring the density of the carbon, and testing the methane uptake of the carbon in a rapid uptake fixture. Carbons made from different precursors, reacted with different activating agents, and heated at different process temperatures for different process hold times were analyzed.