THE EFFECTS OF IMPREGNATION ON POROSITY OF ACTIVATED CARBON

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ABSTRACT

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The purpose of this thesis was to investigate the effects of impregnation to the porosity of activated carbon by using two techniques, i.e., spray and immersion method. The process was performed by impregnating coconut shell-based activated carbon with potassium iodide solution and an additional reducing agent. From the results that obtained, it was found that the adsorption capacity of iodine number was decreased inversely with the weight of the sample as well as the effect of added reducing agent. The presence of an additional reducing agent in the impregnation solution indicates a greater uniformity of distribution of iodide as the impregnation agent on the internal surface of activated carbon. The methylene blue decolourising power was also decreased inversely with the weight of sample. The spray impregnation method was more applicable rather than immersion method, which is time-consuming for effective adsorption capacity.

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CHAPTER 1

INTRODUCTION

Impregnated activated carbons are carbonaceous adsorbents, which have chemicals finely distributed on their internal surface. The impregnation optimizes the existing properties of the activated carbon giving a synergism between the chemicals and the carbon. This facilitates the cost-effective removal of certain impurities from gas streams, which would be impossible otherwise. For environmental protection, various qualities of impregnated activated carbon are available and have been used for many years in the fields of gas purification, civil and military gas protection and catalysis. Impregnation is the process where activated carbon is treated with a chemical reagent that reacts with low molecular weight or polar gases such as chlorine, sulfur dioxide, formaldehyde and ammonia, binding them up on the carbon and thereby removing them from an air stream. This process commonly referred to as "chemisorption" may involve neutralization or catalysis reactions. Carbons containing several types of inorganic impregnants such as iodine (K. Storp *et. al*, 1978), silver, cations such as aluminum, manganese, zinc, iron, lithium and calcium, and organic impregnants such as pyridines, ketones and tertiary amines have also been prepared. The iodine-impregnated carbons can be used as catalysts, in the removal of SO_2 and H_2S from a gas stream and in removing methyl iodide gas from the effluent of a reactor. The treatment of active carbons, charcoals, and carbon blacks with iodine solutions in aqueous (Puri *et. al*, 1965) and nonaqueous media does involve chemisorption of iodine or formation of carbon-iodine surface structures.