Activated Carbon Evaluation on Butane Working Capacity (BWC) for Canister

By :

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ABSTRACT

Charcoal or carbon as it is often called is the most abundant element on earth. The most common forms of carbon are coal, coconut shell, wood, peat and lignite. The charcoal undergoes a process called *Activation.* This is achieved by firstly burning the shells as examples, in the absence of air and then placing the carbonized shells in a kiln full of steam at a temperature above 600° C for between 12-24 hours depend on the requirement that subject to change accordingly. The steam opens up the pores of the charcoal and thereby enlarges them. It is this process of a*ctivation* that creates an enormous internal surface area, which makes the charcoal such an effective adsorbent. *Activation* enlarges the pores of the charcoal so much that a teaspoonful may have a surface area about the size of a football field.

The two key objectives of these project efforts are to improve current carbon application as well as to develop new locally potential carbon resource. The activated carbon development process is enhanced by working closely with Chemical Engineering Department of UiTM, in order to design successful solutions for it's unique applications. Engineering support is provided to all areas, helping to ensure the most efficient and economical application of activated carbons in automotive sectors. In this project applications we are tested to identify the most effective product, needed to meet its specific requirements on canister activated carbon. Our comprehensive experiment establishment on Butane Working Capacity (BWC) will maximize results with minimum exposure on finding the best carbon application for canister on the future development. This process provides the valuable adsorption information while also measuring various carbons' performance.

Activated carbon canister products are used in automotive evaporative emission control systems. This system will control hydrocarbon (HC) emissions, which contribute to the destruction of ozone layers on the earth. In this reports we are focusing on the carbon products specifically designed for gasoline vapor recovery, and can be a guidance to select the most appropriate activated carbon products with the proven physical properties and design flexibility needed to achieve optimum performance in their own canister systems.

To compliments the BWC evaluation activities, it is also important to utilize the finding and apply it for canister. The existing canister is still applicable for the new samples of activated carbon evaluated here. However the intention is to make the studies more comprehensive, and this can be done by studying a new canister design to understand more fully the behavior of the system. The new canister design discussed here is to achieve the optimum result base on BWC evaluation that is related to each other's.

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CHAPTER 1

INTRODUCTION

Until recently the most significant emission control challenge to the automotive manufacturers has been the Ultra Low Emission Vehicle (ULEV) legislation. And in Malaysia it is going towards adopting EURO Step 3 emission standard by year 2005 and beyond. This requires a significant reduction in Hydrocarbon emission (almost 90% reduction from previous condition) compared to conventional Hydrocarbon trapping technology. The severity of this standard is such that very difficult to meet the Hydrocarbon shed test limit without using good system. There are existed many technology solution to meet the Evaporative Emission Control Legislation is being develop by most major vehicle manufacturers. The Evaporative Legislation Control Canister is one of over 2,000 separate components in today's vehicle widely use on today application. The stringent limits can be meet with availability of good high performance activated carbon combined with a good design of canister. The canister application will limit vapor emissions from vehicles and the installation of an Evaporative Loss Control Device (ELCD) is becoming more and more an industry standard. The canister definition is a vessel, which contains activated charcoal used to adsorb fuel vapors and hold them until the vapor can be purged at an appropriate time. In this device activated carbon serves as an adsorbent of vapors emitted from the gasoline tank. *(Bruce, BB. 1991. Automotive evaporative emissions canister adsorptive restraint system, SAE 641021, 1993.*

Prior to this legislation it is the purpose of this project to study and evaluated the activated carbon that will be used for a good canister design. The project paper evaluates the suitability of locally source of activated carbon compared to standard imported carbon. The project is proposed to evaluate the fundamental behavior of carbon i.e. the Butane Working Capacity, BWC. From this experiments it is the project desire to