DEVELOPMENT AND CHARACTERIZATION OF HYDROCARBON ADSORBENT FROM NYLON AND USED TYRE

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ABSTRACT

Raw materials obtained from a local market were used for the production of potential adsorbent. The materials were subjected to preliminary carbonization in a furnace at a controlled temperature in an inert atmosphere and chemical activation was carried out on the carbonized sample. Nylon and used tyre were characterized. Reference carbon was also used to compare the surface area of nylon and tyre. The surface areas of the experimental carbon were compared with that of commercial activated carbon of known surface area (1200m^2/g). The surface area of the used tyre (954m^2/g) has the best adsorptive property which is very close to that of reference carbon.

Keywords: Activated Carbon, Carbonization, Hydrocarbon adsorbent, Nylon, and Used tyre.
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INTRODUCTION

Adsorption is selected as the most economical method for treating a fluid stream on an industrial scale owing to its characteristics such as high concentrating power of the adsorbent, selectivity, chemical instability of the adsorbate (solute), restricting it to temperatures unsuited for other separations; or fluctuating or intermittent supply of the fluid feed (Orthmer, 1985 and Robert, *et. al*, 1997). In adsorption the solid surfaces of adsorbents are of immense importance which can form strong chemical bonds with an adsorbed atom or molecule; it can also affect the rate of chemical reaction (Fogler, 2009).A wide range of adsorption processes have been developed and such processes are in common industrial use particularly in the petroleum and petrochemical industries. The traditional application of adsorption in the process industries has been as a means of removing trace impurities from gas or liquid streams (Robert, 1992). Solid surfaces can adsorb solutes from the solution; an application of such adsorption from solution is the use of activated charcoal for decolourizing sugar solutions and other colouring impurities on its surface. It has been observed that carbon adsorbs non-electrolytes more readily from a solution than electrolytes and inorganic. Solids adsorb electrolytes in preference to non-electrolytes. This behaviour of adsorbents to attract certain substances in preference to other substances leads to a phenomenon of negative adsorption that is concentration of the solute becomes more after treatment with the adsorbent (Sharma and Sharma, 2006; Motoyuki, 1990). Activated carbon is developed from a wide range of organic based materials such as straw, corn cob, wood fibre, saw dust, clay and most carbonaceous materials (Shukla, *et. al*., 2002; and Ahmed, *et. al*., 2004). Development and characterization of hydrocarbon adsorbent from both waste natural and synthetic substances for purification purposes is an important process (WaterLink, 2003; Shukla, *et. al*., 2002; Brunauer, *et. al*., 1983; Satish, *et. al*., 1997). Carbonization of the two raw materials, nylon and used tyre has been performed at different temperatures and subsequently chemical activation was done. The resulting adsorbents were characterized to determine their properties. In our society, waste nylon bags and used tyres are usually thrown to the refuse dumps. Hence this research is aimed at developing and characterizing adsorbents from these wastes thus converting them into useful materials.

MATERIALS AND METHODS

Used nylon bags were freely collected from the environment in Minna town. And