

## Effect of Temperature on the Sorption Characteristic of Carbon Nanotubes

Zaiton Abdul Majid<sup>1</sup>, Nor Aziah Buang<sup>1</sup>, Suhaila Sanip<sup>2</sup>, Daliza Adan<sup>1</sup>, Ahmad Fauzi Ismail<sup>2</sup>

<sup>1</sup>*Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, Skudai, 81310  
Johor, Malaysia*

<sup>2</sup>*Membrane Research Unit, Faculty of Chemical and Natural Resources Engineering, Universiti  
Teknologi Malaysia, Skudai, 81310 Johor, Malaysia*

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### Abstract

A comparative study on the hydrogen sorption characteristics of commercial multi-wall nanotubes (MWNT), single-wall nanotubes (SWNT) and as synthesized carbon nanotubes was undertaken. The hydrogen sorption properties of carbon nanotubes (CNT's) were investigated by means of a Temperature-Programmed Desorption (TPD), BET surface area measurement and Scanning Electron Microscopy (SEM). Hydrogen adsorption was carried out at room temperature, 77K, 70 °C while hydrogen desorption was carried out at 70 °C. Samples were pretreated at 350 °C for 3 hours before saturating the samples with hydrogen for 1 hour at the different adsorption temperatures. The study indicated that the amount of H<sub>2</sub> desorbed is affected by the adsorption temperature and the type of carbon nanotubes. In general, the commercial MWNT sample showed relatively higher amount of hydrogen desorbed per gram sample under the adsorption temperatures studied compared to the commercial SWNT and the as synthesized CNT's. However, at the adsorption temperature of 77 K, the as synthesized CNT showed the highest amount of hydrogen desorbed. The studies also indicated that there is no direct correlation between the amount of hydrogen desorbed and surface area of the CNT's.

**Keywords:** carbon nanotubes, hydrogen sorption, Temperature-Programmed Desorption, BET surface area measurement and Scanning Electron Microscopy

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**Corresponding author:** [afauzi@utm.my](mailto:afauzi@utm.my)