

Synthesis and Performance Adsorbent from Coconut Shells Polyetheretherketone for Natural Gas Storage

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Abstract : The natural gas vehicle represents a cost-competitive, lower-emission alternative to the gasoline-fuelled vehicle. The immediate challenge that confronts natural gas is increasing its energy density. This paper addresses the question of energy density by reviewing the storage technologies for natural gas with improved adsorbent. Technical comparisons are made between storage systems containing adsorbent and conventional compressed natural gas based on the associated amount of moles contained with Compressed Natural Gas (CNG) and Adsorbed Natural Gas (ANG). We also compare gas storage in different cylinder types (1, 2, 3 and 4) based on weight factor and storage capacity. For the storage tank system, we discussed the concept of carbon adsorbents, when used in CNG tanks, offer a means of increasing onboard fuel storage and, thereby, increase the driving range of the vehicle. It confirms that the density of the stored gas in ANG is higher than that of compressed natural gas (CNG) operated at the same pressure. The obtained experimental data were correlated using linear regression analysis with common adsorption kinetic (Pseudo-first order and Pseudo-second order) and isotherm models (Sip and Toth). The pseudo-second-order kinetics describe the best fitness with a correlation coefficient of 9945 at 35 bar. For adsorption isotherms, the Sip model shows better fitness with the regression coefficient (R²) of 0.9982 and with the lowest RSMD value of 0.0148. The findings revealed the potential of adsorbent in natural gas storage applications.

Keywords : natural gas, adsorbent, compressed natural gas, adsorption

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