385d Comparison of Activated Carbons for Natural Gas Storage: Influence of Nonisothermal Effects and Heavy Alkanes

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Natural gas as a vehicular fuel has many advantages over gasoline and diesel. It is comparatively abundant and clean burning. Natural gas vehicles are proven technologies, but problems persist with effective onboard storage capabilities. In this study, a mathematical model is developed for examining charge and discharge steps of natural gas storage cycles with nonisothermal effects and accumulation of heavy alkanes. The model is solved for both adiabatic and isothermal operation. The activated carbons considered in this work are BPL carbon and activated carbon prepared from coconut shells. These materials differ from one another in surface area, capacity for the different alkanes, selectivity for heavier alkanes, and heats of adsorption. Gas storage cycles are simulated for long times (> 1000 cycles), and the results for the carbons are compared to elucidate the relationship between carbon properties and gas storage performance.