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## **Industrial process design and cost analysis for the production of a specific activated carbon**

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Natural gas, a fuel source primarily composed of methane, is already important in many applications. Methane can be used as a fuel for cars, but difficulty arises in the practicality of storing adequate amounts in tanks of reasonable volume. A conventional approach is to compress natural gas to high pressures, a CNG tank, but such tanks must be heavy-duty and if breeched release their flammable contents dangerously rapidly. An alternative approach is to construct a tank occupied by an exceptionally porous material, such as activated carbon, which may be used to store gases by adsorption. Adsorption of gas molecules on the surface of solids may occur spontaneously, reducing the surface free energy at the solid-gas interface and resulting in higher gas densities at the surface. Such an adsorbed natural gas tank (ANG tank) may hold as much natural gas as a CNG tank, but at lower, safer pressures and thus be of a flexible, light-weight design better-suited for automobiles. A process developed by Pfeifer, et al. has produced an activated carbon which has proven superior in methane storage compared to others in the literature. However, producing this activated carbon in the lab has proven very labor-intensive, requiring over ten hours of labor per monolith (~0.1 kg) of activated carbon. Its practical use in a large-scale application such as ANG tanks for automobiles necessitates a production process which is largely automated. The design of such a process and an investigation into the capital investment, maintenance, and labor costs required for it reveals that this activated carbon can be produced in large quantities at much lower costs per monolith than in the lab, and so it is practical for high-volume applications.

