



High Capacity Immobilized Amine Sorbents

Opportunity

The Department of Energy's National Energy Technology Laboratory is seeking licensing partners interested in implementing United States Patent Number 7,288,136 entitled "High Capacity Immobilized Amine Sorbents."

Disclosed in this patent is the invention of a method that facilitates the production of low-cost carbon dioxide (CO₂) sorbents for use in large-scale gas-solid processes. This method treats an amine to increase the number of secondary amine groups and impregnates the amine in a porous solid support. As a result of this improvement, the method increases CO₂ capture capacity and decreases the cost of using an amine-enriched solid sorbent in CO₂ capture systems.

Overview

The U.S. Department of Energy has placed a high priority on the separation and capture of CO₂. However, the costs associated with separation and capture, which includes compression to the required pressure for the sequestration step, are estimated to be three-fourths of the total cost of ocean or geologic sequestration. Existing capture and regeneration methods, such as wet chemical stripping, are complicated, costly, and energy intensive. In addition, associated problems include amine solution degradation, corrosion, and excess water usage. As such, if researchers could improve the separation and capture process, sequestration costs could be reduced.

This carbon sequestration invention provides a new method to produce low-cost CO₂ capture sorbents by using an amine chiefly composed of secondary amine groups incorporated into the pore structure of a high surface area support substrate. In basic terms, the process contains two major steps: modification of an amine, followed by impregnation of the support substrate with the modified amine. The two-step treatment results in an effective, efficient, stable, and regenerable sorbent. It also provides the amine with structural integrity and a high surface area to enhance contact with gas/solid surfaces.

While previous sorbent systems were limited to closed environmental systems only, the current invention can be used in those environmental systems as well as in industrial applications such as coal combustion flue gas and natural gas cleanup.

Significance

This amine sorbent invention has the following advantages:

- Increases CO₂ capture capacity
- Decreases cost of using amine-enriched solid sorbent capture systems
- Reduces corrosion, energy costs, and heat transfer problems
- Reduces steps in the sorbent process
- Increases use of fluids in large-scale utility processes
- Eliminates the need for expensive reactants and solvents to produce sorbents

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