

Novel Carbon Capture Technology (Binding Organic Liquids)

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SUMMARY

Researchers at PNNL have developed a reusable organic liquid that can pull harmful gases such as carbon dioxide or sulfur dioxide out of industrial processes, natural gas streams, and emissions from power plants. The process could directly replace current methods and capture double the amount of harmful gases in a way that uses no water, less energy, and saves money.

Harmful gases such as carbon dioxide or sulfur dioxide are called “acid gases.” The new scrubbing process uses acid gas-binding organic liquids that contain no water and can hold up to three times more harmful gases by weight than the current leading liquid solvents. The result is a significantly lower regeneration energy requirement.

Binding organic liquids are comprised of a combination of an alcohol and strong organic base that grabs the carbon dioxide. The system has been dubbed by PNNL researchers as the “Swiss Army Knife” of chemical solvents because of the ability to tailor the specific chemistry to the specific gas separation application.

PNNL’s previous work with the binding organic liquids focused on pulling only carbon dioxide out of emissions from power plants. However, the tool may be used in a number of industrial process applications. PNNL researchers have also developed systems that bind sulfur dioxide, carbonyl sulfide, and carbon disulfide.

ADVANTAGES

Low regeneration energy. Estimates show a 50% lower energy requirement for flue gas separations compared to the competing commercial option.

Reduced costs. As a result of low water use in the system, lab tests indicate the potential for significantly less corrosion and damage to the system.

Applicable to multiple gas impurities. Binding organic liquids may be useful to a number of gas impurities (i.e. CO₂, SO₂, COS, etc.), which enables an integrated emissions treatment system.

High capacities. Theoretical capacities are as high as 300% by weight and up to 50% more CO₂ by volume compared to commercially available, water-based systems.

Multiple industrial process applications. Examples of industrial process applications include removing acid gasses from natural gas streams and for CO₂ capture from power plant flue gas streams.

Available for licensing in all fields

Patents & Intellectual Property:

Patent #: 7,799,299

