

Switchable Solvents and Methods of Use Thereof (#3776)

A switchable solvent that reversibly converts from a nonionic liquid mixture to an ionic liquid upon contact with a selected trigger

Inventors at Georgia Tech have developed a switchable solvent that reversibly converts from a nonionic liquid mixture to an ionic liquid upon contact with a selected trigger, such as CO₂ and can be readily converted back to the nonionic liquid mixture upon removal of the CO₂. As an example, the invention describes a switchable solvent systems in which the solvents are based on amidine or guanidine and switch between a first form with no local charges and a second, zwitterionic form in response to selected trigger such as CO₂, CS₂, or COS. CO₂ is the most convenient.

Benefits/Advantages

- **Lowers cost** - eliminates the need to add and remove multiple solvents for each reaction step
- **Lower pollution** - eliminates the need to remove and capture solvents
- **Easier separation of product** - ideal for separation of vegetables such as soybean oil

Potential Commercial Applications

- Reversible CO₂ capture
- Extraction of oil from tar sands/oil shale
- Extraction of vegetable oils from plant solids

Background/Context for This Invention

Many industrial chemicals and pharmaceutical products are the result of the reaction of an inorganic salt with and organic substrate. In most cases, a phase transfer catalyst must then be added to the reaction to separate out the product from the reaction mix. These phase catalyst compounds are often hard to remove. To overcome this challenge, smart solvents have been designed which can reversibly change properties upon the addition or removal of an agent. These smart solvents in a polar state can dissolve both organic and inorganic compounds and then once the reaction is complete, switch to a nonpolar state to allow the easier separation and isolation of the reaction product.

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Patent/IP Information

U.S. Patent Issued

[US7106429B2](#)

<https://patents.google.com/patent/US8710265>

Publications

For more information about this technology, please visit:

<https://licensing.research.gatech.edu/technology/switchable-solvents-and-methods-use-thereof>