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12015

Patent(s) Issued

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Available Technologies

Membrane Separations: Ultrafiltration Using Supercritical Fluids

SUMMARY

The use of reverse micelles in supercritical fluid solvents coupled with ultrafiltration membranes for the separation of macromolecules is presented here. This methodology allows one to address the separation of a wide range of polar molecules greatly extending the type of molecules that can be separated using only pure supercritical fluids. The solutes to be separated are initially dissolved in the reverse micellar solution and introduced into the pressure vessel containing the membrane. The surfactant and water core are passed through the membrane while the macromolecule selectivity is based on size and molecular weight. The separation is controlled through the pore size and type of membrane used, which could be either organic or inorganic in composition, such as typical reverse osmosis, ultra- and nanofiltration membranes.

By using a cross-flow along the retentate side of the membrane, one can remove the macromolecule or macromolecular structure from the extraction/separation system. This extraction/separation is especially convenient as it can be done while avoiding a depressurization step. A continuous recycle in an extraction system is also possible, further enhancing the energy efficiency of the process. Thus, the enhanced energy efficiency from such a process can make a large-scale continuous extraction process viable. Some applications of this technology might be in the purification of polymers or proteins, and for the extraction of the macromolecules from fermentation broths or other complex matrices.

Details have been published. Please see Journal of Supercritical Fluids, 2003, 25, 225, “Membrane separations using reverse micelles in nearcritical and supercritical fluid solvents.”

U.S. DEPARTMENT OF ENERGY

Patents & Intellectual Property

» Patent #: 6,264,726

Technology Portfolio(s)

» Supercritical Fluid Processing

Potential Industry Applications

» Chemicals

Eric C. Lund
Pacific Northwest National Laboratory
(509) 375-3764
eric.lund@pnnl.gov
http://availabletechnologies.pnnl.gov

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