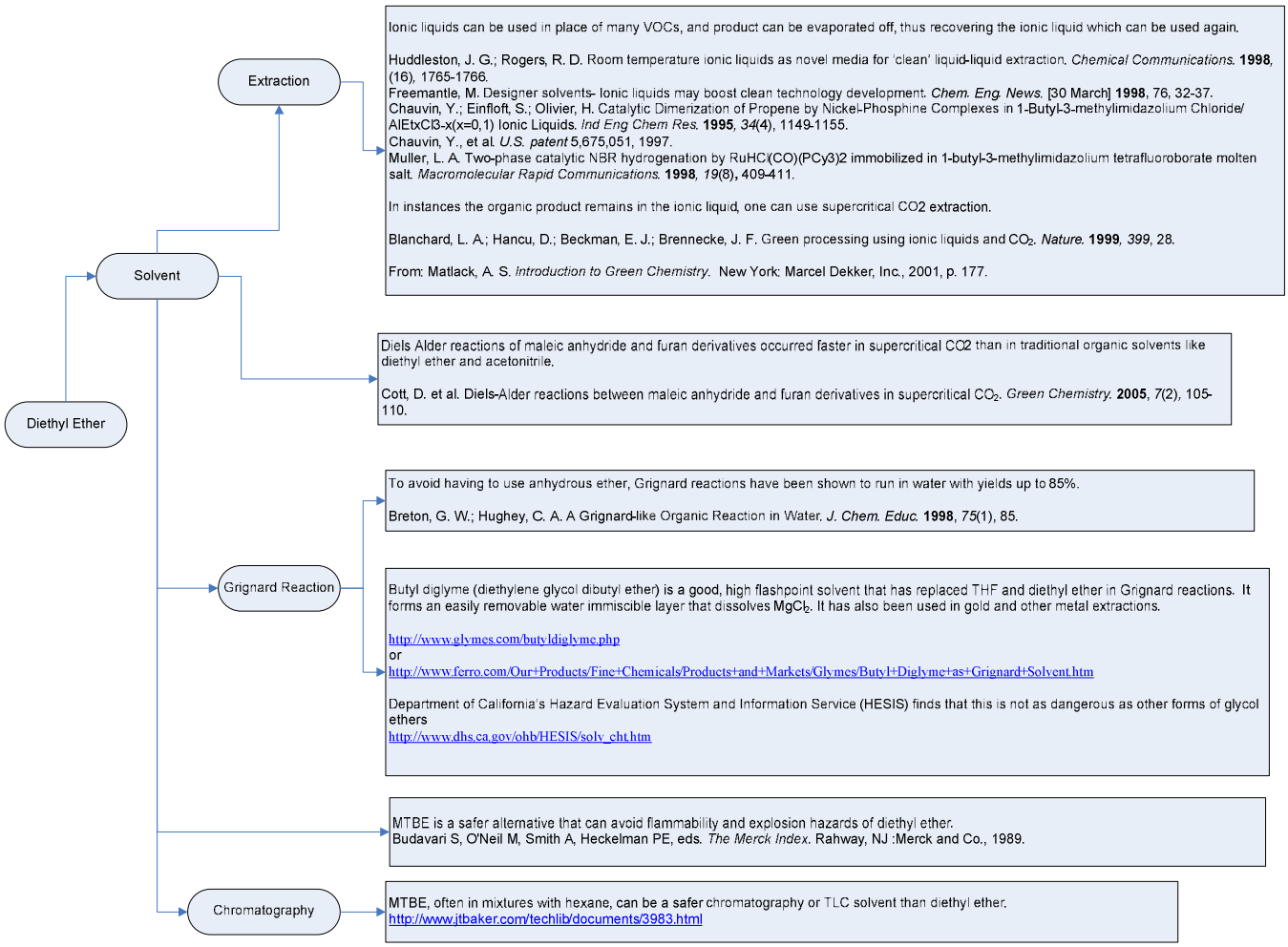
Diethyl Ether
Solvent
Extraction
Ionic liquids can be used in place of many VOCs, and product can be evaporated off, thus recovering the ionic liquid which can be used again.
Huddleston, J. G.; Rogers, R. D. Room temperature ionic liquids as novel media for 'clean' liquid-liquid extraction. Chemical Communications. 1998, (16), 1765-1766.
Freemantle, M. Designer solvents- Ionic liquids may boost clean technology development. Chem. Eng. News. [30 March] 1998, 76, 32-37.
Chauvin, Y.; Einfloft, S.; Olivier, H. Catalytic Dimerization of Propene by Nickel-Phosphine Complexes in 1-Butyl-3-methylimidazolium Chloride/ AlEtxCl3-x(x=0,1) Ionic Liquids. Ind Eng Chem Res. 1995, 34(4), 1149-1155.
Chauvin, Y., et al. U.S. patent 5,675,051, 1997.
Muller, L. A. Two-phase catalytic NBR hydrogenation by RuHCl(CO)(PCy3)2 immobilized in 1-butyl-3-methylimidazolium tetrafluoroborate molten salt. Macromolecular Rapid Communications. 1998, 19(8), 409-411.
In instances the organic product remains in the ionic liquid, one can use supercritical CO2 extraction.
Blanchard, L. A.; Hancu, D.; Beckman, E. J.; Brennecke, J. F. Green processing using ionic liquids and CO2. Nature. 1999, 399, 28.
From: Matlack, A. S. Introduction to Green Chemistry. New York: Marcel Dekker, Inc., 2001, p. 177.
Diels Alder reactions of maleic anhydride and furan derivatives occurred faster in supercritical CO2 than in traditional organic solvents like diethyl ether and acetonitrile.
Cott, D. et al. Diels-Alder reactions between maleic anhydride and furan derivatives in supercritical CO2. Green Chemistry. 2005, 7(2), 105-110.
Grignard Reaction
To avoid having to use anhydrous ether, Grignard reactions have been shown to run in water with yields up to 85%.
Breton, G. W.; Hughey, C. A. A Grignard-like Organic Reaction in Water. J. Chem. Educ. 1998, 75(1), 85.
Butyl diglyme (diethylene glycol dibutyl ether) is a good, high flashpoint solvent that has replaced THF and diethyl ether in Grignard reactions. It forms an easily removable water immiscible layer that dissolves MgCl2. It has also been used in gold and other metal extractions.
http://www.glymes.com/butyldiglyme.php
or
http://www.ferro.com/Our+Products/Fine+Chemicals/Products+and+Markets/Glymes/Butyl+Diglyme+as+Grignard+Solvent.htm
Department of California's Hazard Evaluation System and Information Service (HESIS) finds that this is not as dangerous as other forms of glycol ethers
http://www.dhs.ca.gov/ohb/HESIS/solv_cht.htm
MTBE is a safer alternative that can avoid flammability and explosion hazards of diethyl ether.
Budavari S, O'Neil M, Smith A, Heckelman PE, eds. The Merck Index. Rahway, NJ :Merck and Co., 1989.
Chromatography
MTBE, often in mixtures with hexane, can be a safer chromatography or TLC solvent than diethyl ether.
http://www.jtbaker.com/techlib/documents/3983.html