**Lesson Plan: Lecture 17**

**Working without Solvents**

**Description**

In this class students will learn the possibilities to perform chemical transformations without the presence of an organic solvent. Students will explore alternative methodologies ranging from supercritical fluids to solventless conditions. The goal of this lecture is to not only inform student of alternative methodologies, but to provide real example of how these approaches are used today.

**Prior to Lecture**

Required Readings:

* “Green Chemistry: Theory and Practice”, Anastas and Warner, Oxford University Press, Ch. 4 Section 5

Optional/Supplemental Readings:

* “Introduction to Green Chemistry”, Albert S. Matlack, CRC Press, Ch. 8, 2nd Edition, 2010.
* Andrew P. Dicks (2009) Solvent-free reactivity in the undergraduate organic laboratory, Green Chemistry Letters and Reviews, 2:2, 87-100, DOI: 10.1080/17518250903164549 <https://www.tandfonline.com/doi/full/10.1080/17518250903164549?scroll=top&needAccess=true>
* Andrew P. Dicks (2009) A review of aqueous organic reactions for the

undergraduate teaching laboratory, Green Chemistry Letters and Reviews, 2:1, 9-21, DOI: 10.1080/17518250902820182 <https://www.tandfonline.com/doi/full/10.1080/17518250902820182>

**Topics to Cover**

* Understand there are other options available to solvent usage
* Supercritical Fluids
* Ionic Liquids
* Water
* Solvent-free conditions
* A Tiered approach to solvent substitutions

**Class Exercise:**

* No class exercise for this lecture

**Homework**

* Assign Homework #4: Solvent Substitution: CHEM21 Solvent Selection Guide
	+ Required reading for the homework**:** <https://pubs.rsc.org/en/content/articlelanding/gc/2016/c5gc01008j#!divAbstract> CHEM21 selection guide of classical- and less classical solvents, Green Chem., 2016, 18, 288-296. (File name: CHEM21 article\_Green Chem\_2016.pdf)
	+ Students will evaluate two InkJet ink formulations. If you would like to use a synthetic chemistry example, use the solvent selection exercise that can be found on the CHEM21 website: <http://learning.chem21.eu/methods-of-facilitating-change/tools-and-guides/final-self-assessment-test/>