

GREEN CHEMISTRY

'Green Chemistry is the design of chemical products and processes that reduce and/or eliminate the use or generation of hazardous substances'



Maintaining a **chemical inventory** can help prevent the over-purchasing of chemicals and reduce the amount of chemical waste. Make inventories available to other labs to enable the sharing of chemicals.

Plan work in advance to minimise the use of chemicals and reduce as much waste as possible.

Look for **less harmful alternatives**, this will reduce the generation of hazardous waste and your exposure to hazardous chemicals.

Dispose of Chemicals in the correct way.



Greener Solvent Guide

For more resources for Green Chemistry in chemistry education: <http://bit.ly/gc-resources>

Key: **Hazardous** **Problematic** **Preferred**

* Indicates Highly Hazardous

Undesirable Solvents	Alternative
Pentane, Hexane(s)	Heptane
DMF, DMAc, NMP, DMSO	Acetonitrile, Cyrene ^c , Cyclopentyl methyl ether (CPME) ^a , dimethyl carbonate ^c
Tetrahydrofuran, Methyl tert-butyl ether (MTBE)	2-Methyltetrahydrofuran (2-MeTHF), CPME
Di-isopropyl ether or diethyl ether*	2-MeTHF or tert-butyl methyl ether, CPME
Dioxane or dimethoxyethane	2-MeTHF or tert-butyl methyl ether, CPME
Chloroform*, dichloroethane* or CCl₄*	Dichloromethane
Pyridine (as a base)	Triethylamine (Et ₃ N)
Dichloromethane (in extractions)	Ethyl acetate (EtOAc), MTBE, toluene, 2-MeTHF
Dichloromethane (in chromatography)	EtOAc/heptane ^b , 3:1 EtOAc/EtOH ^b
Benzene*	Toluene
Acetone	Ethyl lactate ^a

For a review of organic reactions in water: <http://bit.ly/org-rx-water>

For a review of solvent-free organic reactions: <http://bit.ly/solvent-free-org-rx>

References:

- Prof. D., et al, *Green Chemistry*, **2016**, *18*, 288-296; Dunn, P. J., et al, *Green Chemistry*, **2008**, *10*, 31-36.
 a. MilliporeSigma Greener Solvent Alternatives [https://www.sigmaaldrich.com/technical-documents/articles/analytical/solvents-and-reagents/greener-solvent-alternatives.html].
 b. Taygerly, J.P., et al, *Green Chemistry*, **2012**, *14*, 3020-3025.
 c. Byrne, F.P., et al, *Sustain Chem Process* **2016**, *4*, 71-24.

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