

Green Chemistry

What is Green Chemistry?

According to the EPA, Green Chemistry is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.

Make the Pledge:

No new chemical, or process by which that chemical would be manufactured, should be commercialized without a complete green chemistry screen for human health and environmental impacts.

Tools:

GreenScreen – <http://www.greenscreenchemiclas.org/>

Pharos – <http://www.pharosproject.net/>

GreenSuite – www.chemply.com

ToxCast™ - <http://www.epa.gov/ncct/toxcast>

TiPED – www.tipedinfo.com

DfE – www.epa.gov/dfe/

MBDC – www.mbdc.com/

NSF International - <http://www.nsf.org/services/by-industry/sustainability-environment/>

UL – www.ul.com

GaBi Software - <http://www.gabi-software.com/america/index/>

Isustain - <https://www.isustain.com/>

EIOLCA - <http://www.eiolca.net/>

Resources:

Annual PDF of US EPA Presidential Green Chemistry Challenge Awards,

<http://www2.epa.gov/green-chemistry/presidential-green-chemistry-challenge-winners>

Yale University - <http://www.greenchemistry.yale.edu/> (Dr. Paul Anastas and Dr. Julie Zimmerman)

UC Berkeley - <http://bcgc.berkeley.edu/> (Dr. Martin Mulvihill)

University of Nottingham - <http://www.nottingham.ac.uk/chemistry/index.aspx> (Dr. Martyn Poliakoff)

University of Melbourne – <http://www.monash.edu.au/research/capabilities/leading/green.html>
(Dr. Milton Hearn)

University of Oregon – <http://greenchem.uoregon.edu/> (Dr. James Hutchison, Dr. Julie Haack)

Warner-Babcock Institute for Green Chemistry - <http://www.warnerbabcock.com/>

12 Principles of Green Chemistry

- 1) Prevent waste
- 2) Maximize atom economy
- 3) Design less hazardous chemical syntheses
- 4) Design safer chemicals and products
- 5) Use safer solvents and reaction conditions
- 6) Increase energy efficiency
- 7) Use renewable feedstocks
- 8) Avoid chemical derivatives
- 9) Use catalysts, not stoichiometric reagents
- 10) Design chemicals and products that degrade after use
- 11) Analyze in real time to prevent pollution
- 12) Minimize the potential for accidents

Books:

General

Confessions of a Radical Industrialist, by Ray C. Anderson

The Ecology of Commerce, by Paul Hawken

Chasing Molecules, by Elizabeth Grossman

Textbooks

Green Engineering, Environmental Conscious Design of Chemical Processes, by David T. Allen and David R. Shonnard

Green Chemistry and Engineering, A Practical Design Approach, by Concepcion Jimenez-Gonzalez and David J. C. Constable