Twelve Principles of Green Chemistry*

1. **Prevention** - Prevent waste rather than treating or cleaning up after waste has been created.
2. **Atom Economy** – Design synthetic methods to maximize the incorporation of all materials used in the process into the final product.
3. **Less Hazardous Chemical Syntheses** - Generate substances that possess little or no toxicity to human health and the environment.
4. **Design Safer Chemicals** - Chemical products should be designed to affect their desired function while minimizing their toxicity.
5. **Safer Solvents and Auxiliaries** - The use of auxiliary substances (e.g., solvents, separation agents, etc.) should be made unnecessary wherever possible and innocuous when used. Need help finding alternatives? Check MIT’s “Green” Alternatives Wizard at [http://ehs.mit.edu/greenchem/](http://ehs.mit.edu/greenchem/)
6. **Design for Energy Efficiency** – Use ambient temperature and pressure if possible.
7. **Use of Renewable Feedstocks** - Reagents should be renewable rather than depleting whenever technically and economically practical.
8. **Reduce Derivatives** – Avoid unnecessary derivatization (use of blocking groups, protection/ deprotection, temporary modification of physical/chemical processes), because such steps require additional reagents and can generate additional waste.
9. **Selective Catalysis** - is superior to stoichiometric reagents.
10. **Design for Degradation** - End products should break down into innocuous degradation products and do not persist in the environment.
11. **Real-time Analysis for Pollution Prevention** – Develop analytical methodologies to allow for real-time, in-process monitoring and control prior to the formation of hazardous substances.
12. **Inherently Safer Chemistry for Accident Prevention** - Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.


What can you do to “Green up” your lab?