

What is Green Chemistry?

- ◆ Green Chemistry is the *design* of chemical products and processes that reduce or eliminate the *use and/or generation* of hazardous substances.

Assoc Prof Abd Naser HJ Samoh, Ph.D.
Fac of Sci & Technol, YRU

What is Green Chemistry ?

- Green chemistry can also be described as
 - Sustainable chemistry.
 - Chemistry that is benign by design.
 - Pollution prevention at the molecular level.
 - All of the above.

Twelve Principles of Green Chemistry

- ◆ 1. Prevention
- ◆ 2. Atom Economy
- ◆ 3. Less Hazardous Chemical Syntheses
- ◆ 4. Designing Safer Chemicals
- ◆ 5. Safer Solvents and Auxiliaries
- ◆ 6. Design for Energy Efficiency
- ◆ 7. Use of Renewable Feedstocks
- ◆ 8. Reduce Derivatives
- ◆ 9. Catalysis
- ◆ 10. Design for Degradation
- ◆ 11. Real-time Analysis for Pollution Prevention
- ◆ 12. Inherently Safer Chemistry for Accident Prevention

Green Chemistry

- Not a solution to all environmental problems.
- The most fundamental approach to preventing pollution.
- Recognizes the importance of incremental improvements.

Question #1

- Green chemistry is
 - A reaction that utilizes a green liquid.
 - The design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.
 - Anything, including treatment or recycling, that reduces pollution.
 - Any reaction performed by Kermit the Frog or his relatives.

Question #2

- A renewable feedstock (starting material) that may be used as a source for organic chemicals is
 - Petroleum.
 - Biomass.
 - Coal.
 - Natural gas.

Question #3

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 - Pollution prevention at the molecular level.
 - All of the above.

Question #4

- A “green” solvent that may be used in some organic reactions is
 - Benzene.
 - Methylene chloride.
 - Water.
 - Ether.

Answers to Questions

1. The design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances.
2. Biomass.
3. All of the above.
4. Water.