

# Green Chemistry

The background features abstract, organic shapes in light blue and white against a white background. A series of concentric, slightly wavy orange lines radiate from the center, creating a sense of depth and motion.

## GREEN CHEMISTRY

- Utilization of a set of principles that reduces / eliminates the use/generation of hazardous substances in design, manufacture & application of products
- Focuses on:
  - Reduction, Recycling and eliminating toxic substances
  - Finding eco-friendly alternatives that don't impact environment
  - Sustainable development, business & living practises

## Principles of Green Chemistry:

- Renewable feedstock must be used wherever technically & economically possible.
- Biomass, agricultural wastes are recommended renewable feedstock instead of coal, petroleum based raw materials etc.,

- Avoid unnecessary derivatives
- Temporary modification avoided whenever possible as they generate waste
- Atom efficiency is reduced as protective grp isn't incorporated in final product  
ex: Blocking group, protection/deprotection

- Use catalysts to:
  - Speed up r/n
  - Can be recycled & highly selective
  - Less energy consumption during r/n
- Obtain high yield product of high purity
- Stoichiometric rns X as they use excessive reagents

- Applicable to:
  - insecticides
  - pesticides
  - polymers
- Design Chemicals & products that degrade into innocuous substances & don't accumulate in the environment
- persistent in environment & cause bioaccumulations

- Design Chemicals & products that degrade into innocuous substances & don't accumulate in the environment
- persistent in environment & cause bioaccumulations

- Synthesis only targeted product with minimum wastage
- Waste involves cost & time to dispose, causing more production cost

• Synthetic methods should be:

- Designed to maximize usage of all materials into final product
- Chemical processes with max yield

$$\% \text{ Atom Economy} = \frac{\text{FW of atoms used}}{\text{FW of all reactants}} \times 100$$

• In substitution  $\text{r/n} \Rightarrow AE = \text{moderate}$   
 elimination  $\text{r/n} \Rightarrow AE = \text{low}$   
 addition  $\text{r/n} \Rightarrow AE = 100\%$   
 rearrangement  $\text{r/n} \Rightarrow AE = 100\%$

→ Green Synthesis, because 100% usage

