M.SC Semester III
Core Course XII
Environmental Chemistry

TOPIC:-Unit IV, Green Chemistry, Efficiency

Parameter & Atom Economy

Department of Chemistry
L.S COLLEGE MUZAFFARPUR
B. R. A. BIHAR UNIVERSITY
Dr. Priyanka

Efficiency Parameter

1. Reaction Yield

- $$Reaction\ Yield = \frac{Actual\ Yield}{Theoretical\ Yield} \times 100$$

- The reaction should have high percentage of yield.

2. Atom Economy

- Atom economy describes the conversion efficiency of a chemical process in terms of all atoms involved (desired products produced).

$$Atom\ Economy = \frac{Mol.\ weight\ of\ Desired\ product}{Mol.\ weight\ of\ all\ reactants} \times 100$$

- For the reaction, the atom economy should be maximum.

Atom Economy

e.g.

- **Rearrangement Reactions:**
- These reactions involves rearrangement of atoms that forms molecule. Hence, the atom economy of these reactions are 100%.

- **Addition Reactions:**
- These reactions involves addition of two or more molecules without elimination that forms molecule. Hence, the atom economy of these reactions are 100%

- Conversion factor:

$$\text{Conversion} = \frac{\text{Amount of reactant reacted}}{\text{Amount of reactant taken}} \times 100$$

- Reaction Selectivity

Reaction Selectivity =

$$\frac{\text{Amount of desired product formed}}{\text{Amount of product expected on the basis of reactant consumed}} \times 100$$

Environmental Load Factor:

- It is represented by E and it should be minimum.

$$E = \frac{\text{Total mass of effluent formed}}{\text{Mass of desired products}} \times 100$$