LIMITING AND EXCESS REACTANTS

Understanding Reactants in Chemical Reactions

INTRODUCTION

- Chemical reactions involve reactants and products.
- One reactant is completely used up first this is the limiting reactant.
- The reactant that remains after the reaction is called the excess reactant.

KEY CONCEPTS

- Limiting Reactant \rightarrow Determines how much product can be formed (used up first).
- Excess Reactant \rightarrow The reactant that is leftover after the reaction.

REAL LIFE ANALOGY

Making sandwiches:

- You have 10 bread slices and 6 cheese slices.
- Each sandwich needs **2 bread slices** and **1 cheese slice**.
- You can make **5** sandwiches.
- Bread is the **limiting reactant** (used up first).
- Cheese is the **excess reactant** (some left over).



STEPS TO IDENTIFY THE LIMITING REACTANT

- 1. Write the balanced chemical equation.
- 2. Convert given reactant amounts to moles.
- 3. Use mole ratios to compare reactant amounts.
- 4. The reactant that produces the least product is the limiting reactant.

SAMPLE PROBLEM

Given:

- 4 moles of H₂ and 3 moles of O₂
- Reaction: $2H_2 + O_2 \rightarrow 2HO_2$

Solution:

- 0, needed
- But we have 3 moles O₂ available
 - \rightarrow O₂ is in excess
- Since H₂ runs out first, it is the limiting reactant.



• 4 moles H x $(10_2 / 2 H_2) = 2$ moles



SUMMARY

- **Limiting reactant** → Determines product amount (used up first).
- **Excess reactant** \rightarrow Leftover reactant.
- Use mole ratios and a balanced equation to determine them.

THANK YOU