What is a Limiting Reactant?

Worksheet

The limiting reactant is the reactant that runs out first in a chemical reaction, determining the maximum amount of product that can form. Other reactants are present in excess.

Questions

1. In 2A + B C, you have 8 mol A and 5 mol B. Which is limiting?

A) A (needs 10 mol)
B) B (runs out at 4 mol A)
C) Both equally
D) Cannot determine

2. How do you find the limiting reactant?

A) Compare total moles
B) Divide moles by stoichiometric coefficients
C) Measure mass
D) Check molecular weight

3. What limits product formation?

A) The largest amount of reactant
B) The smallest amount of reactant
C) The limiting reactant
D) Excess reactants

4. 3H + N 2NH. You have 6 mol H and 3 mol N. Limiting?

A) H (needs 9 mol)
B) N (limiting at 2 mol)
C) Both equal
D) Neither

5. In the reaction 2H + O 2HO, you have 5 moles of H and 3 moles of O. Which is the limiting reactant?

6. 4 mol N and 10 mol H react: N + 3H 2NH. Find the limiting reactant.

7. A reaction uses 6 mol of reactant X and 4 mol of reactant Y. If the ratio is X:Y = 2:3, what is limiting?

8. Define: What is a limiting reactant?

9. Define: How do you identify the limiting reactant?

10. Define: What happens to excess reactants?

Answer Key

1. A) A (needs 10 mol) - A needs 8 2 = 4 mol B; you have 5, so A is limiting.
2. B) Divide moles by stoichiometric coefficients - The smallest mole-to-coefficient ratio is the limiting reactant.
3. C) The limiting reactant - The limiting reactant runs out first and stops the reaction.
4. B) N (limiting at 2 mol) - H needs 6 3 = 2 mol N; you have 3, so N is limiting.
5. Stoichiometry ratio H:O = 2:1 H requires: 5 mol 2 = 2.5 mol O You have 3 mol O, which is more than 2.5 mol Therefore, H is the limiting reactant
6. Stoichiometry ratio N:H = 1:3 H needed: 4 mol 3 = 12 mol You have 10 mol H, which is less than 12 mol needed H is the limiting reactant
7. Stoichiometry X:Y = 2:3 (or 1:1.5) X requires: 6 mol 2 = 3 mol Y needed You have 4 mol Y, which is more than 3 mol Therefore, X is the limiting reactant
8. The reactant that runs out first and determines how much product can form.
9. Divide moles of each reactant by its stoichiometric coefficient - the smallest ratio is limiting.
10. They remain unreacted after the limiting reactant is consumed.