

What is a Limiting Reactant?

Worksheet

To find the limiting reactant, calculate how many moles of product each reactant would form, treating each as the limiting one. Whichever makes the least product is the limiting reactant.

Questions

1. $2A + B \rightarrow 2C$. With 10 mol A and 4 mol B, which is limiting?

- A) A
- B) B
- C) Both equally
- D) Cannot tell

2. What does a limiting reactant do?

- A) Speeds up the reaction
- B) Controls how much product forms
- C) Increases temperature
- D) Requires a catalyst

3. In $2H + O \rightarrow 2HO$ with 5 mol H and 3 mol O, what is limiting?

- A) H
- B) O
- C) Both
- D) Neither

4. After reaction stops, limiting reactant

- A) remains unchanged
- B) is completely consumed
- C) is partially consumed
- D) stops the catalyst

5. In $2H + O \rightarrow 2HO$, if you have 5 mol H and 2 mol O, which is limiting?

6. For $N + 3H \rightarrow 2NH$, with 3 mol N and 8 mol H, find the limiting reactant.

7. $A + 2B \rightarrow C$, with 4 mol A and 6 mol B. Which limits the reaction?

8. Define: What is a limiting reactant?

9. Define: Can you have multiple limiting reactants?

10. Define: What happens to excess reactant?

Answer Key

1. B) B - A needs 5 mol B, but only 4 available, so B is limiting.
2. B) Controls how much product forms - Limiting reactant runs out first, determining maximum product.
3. B) O - H needs 2.5 mol O, but 3 available, so O is limiting (needs 5 mol H, has 5, so uses all O).
4. B) is completely consumed - By definition, limiting reactant is completely used up.
5. If H is limiting: $5 \text{ mol H} (1 \text{ mol O}/2 \text{ mol H}) = 2.5 \text{ mol O}$ needed. Only 2 available, so H is in excess. If O is limiting: $2 \text{ mol O} (2 \text{ mol H}/1 \text{ mol O}) = 4 \text{ mol H}$ needed. 5 available, so O is limiting.
6. If N is limiting: $3 \text{ mol N} (3 \text{ mol H}/1 \text{ mol N}) = 9 \text{ mol H}$ needed. Only 8 available, so H is limiting. H is the limiting reactant (needs 9, have 8).
7. If A is limiting: $4 \text{ mol A} (2 \text{ mol B}/1 \text{ mol A}) = 8 \text{ mol B}$ needed. Only 6 available, so B is limiting. B is the limiting reactant.
8. The substance completely consumed first, stopping the reaction and controlling product yield.
9. No - only one runs out first (unless perfectly stoichiometric).
10. It remains unreacted after the reaction stops.

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