

Chemistry- Chapter 9
Limiting Reactants- No excess reactant

1. Zinc and sulfur react to form zinc sulfide.
a. Write the balanced chemical equation.



- b. If 2.00 mol of zinc are heated with 1.00 mol of sulfur, identify the limiting reactant.

$$\frac{2.00 \text{ mol Zn}}{1} \times \frac{1 \text{ mol S}}{1 \text{ mol Zn}} = 2 \text{ mol S} \quad \text{Need}$$

S is L.R.

2. Metallic magnesium reacts with steam to produce magnesium hydroxide and hydrogen gas.
a. Write the balanced chemical equation.



- b. If 16.2 g magnesium are heated with 12.0 g water, what is the limiting reactant?

$$\frac{16.2 \text{ g Mg}}{1} \times \frac{1 \text{ mol Mg}}{24.305 \text{ g Mg}} \times \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol Mg}} \times \frac{18.015 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 24.01 \text{ g H}_2\text{O} \quad \text{Need}$$

H₂O is L.R.

3. 2.50 mol of copper (II) and 5.50 mol of silver nitrate are available to react by single displacement.
a. Write the balance chemical equation.



- b. Determine the limiting reactant.

$$\frac{2.50 \text{ mol Cu}}{1} \times \frac{2 \text{ mol AgNO}_3}{1 \text{ mol Cu}} = 5 \text{ mol AgNO}_3 \quad \text{Need}$$

Cu is L.R.

4. If 862 g ZrSiO₄ and 950 g of Cl₂ react, what is the limiting reactant?



$$\frac{862 \text{ g ZrSiO}_4}{1} \times \frac{1 \text{ mol ZrSiO}_4}{183.307 \text{ g ZrSiO}_4} \times \frac{2 \text{ mol Cl}_2}{1 \text{ mol ZrSiO}_4} \times \frac{70.91 \text{ g Cl}_2}{1 \text{ mol Cl}_2} = 666.9 \text{ g Cl}_2 \quad \text{Need}$$

ZrSiO₄ is L.R.

5. Aluminum undergoes a synthesis reaction with oxygen.

a. Write the balanced chemical equation.



b. If 3.17 g aluminum and 2.55 g oxygen are available, what is the limiting reactant?

$$\frac{3.17 \text{ g Al}}{1} \times \frac{1 \text{ mol Al}}{26.982 \text{ g Al}} \times \frac{3 \text{ mol O}_2}{4 \text{ mol Al}} \times \frac{31.998 \text{ g O}_2}{1 \text{ mol O}_2} = 2.82 \text{ g O}_2$$

Need

O₂ is L.R.

6. Copper (II) sulfide reacts with oxygen gas to form copper (II) oxide and sulfur dioxide.

a. Write the balanced chemical equation.



b. If 100 g of copper (II) sulfide and 56 g of oxygen are available, what is the limiting reactant?

$$\frac{100 \text{ g CuS}}{1} \times \frac{1 \text{ mol CuS}}{95.61 \text{ g CuS}} \times \frac{3 \text{ mol O}_2}{2 \text{ mol CuS}} \times \frac{31.998 \text{ g O}_2}{1 \text{ mol O}_2} = 50.2 \text{ g O}_2$$

Need

CuS is L.R.

7. Magnesium iodide and bromine undergo a single displacement reaction.

a. Write the balanced chemical equation.



b. If 560 g of magnesium iodide reacts with 360 g of bromine, what is the limiting reactant?

$$\frac{560 \text{ g MgI}_2}{1} \times \frac{1 \text{ mol MgI}_2}{278.11 \text{ g MgI}_2} \times \frac{1 \text{ mol Br}_2}{1 \text{ mol MgI}_2} \times \frac{159.81 \text{ g Br}_2}{1 \text{ mol Br}_2} = 321.8 \text{ g Br}_2$$

Need

MgI₂ is L.R.

8. Copper (II) sulfate reacts with iron (III) in a single displacement reaction.

a. Write the balanced chemical equation.



b. If you place 0.092 mol of iron filings in a solution of 0.158 mol of copper (II) sulfate, what is the limiting reactant?

$$\frac{0.092 \text{ mol Fe}}{1} \times \frac{3 \text{ mol CuSO}_4}{2 \text{ mol Fe}} = 0.138 \text{ mol CuSO}_4$$

Need

0.092 mol Fe is L.R.