

Name: CALVIN
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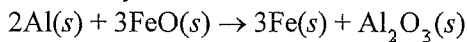
Ch.12 Review

1. In a chemical reaction, the mass of the products C.
- is less than the mass of the reactants
 - is greater than the mass of the reactants
 - c is equal to the mass of the reactants
 - has no relationship to the mass of the reactants

2. The most important from Ch.12 is to ____.
- add the coefficients of the reagents
 - b convert given quantities to moles
 - convert given quantities to volumes
 - convert given quantities to masses

1:2 3. In the reaction $2\text{CO}(g) + \text{O}_2(g) \rightarrow 2\text{CO}_2(g)$, what is the ratio of moles of oxygen used to moles of CO_2 produced?
1:2

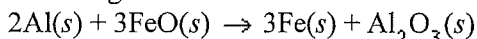
4. How many moles of aluminum are needed to react completely with 5.2 mol of FeO ?



x mol 5.2 mol

$$\frac{5.2 \text{ mol FeO}}{3 \text{ mol FeO}} \times \frac{2 \text{ mol Al}}{3 \text{ mol FeO}} = 3.5 \text{ mol Al}$$

5. Calculate the number of moles of Al_2O_3 that are produced when 0.90 mol of Fe are produced in the following reaction.



0.90 mol x mol

$$\frac{0.90 \text{ mol Fe}}{3 \text{ mol Fe}} \times \frac{1 \text{ mol Al}_2\text{O}_3}{3 \text{ mol Fe}} = 0.30 \text{ mol Al}_2\text{O}_3$$

6. Iron(III) oxide is formed when iron combines with oxygen in the air. How many grams of Fe_2O_3 are formed when 26.7 g of Fe reacts completely with oxygen?



26.7 g

x g

$$\frac{26.7 \text{ g Fe}}{55.85 \text{ g Fe}} \times \frac{1 \text{ mol Fe}}{4 \text{ mol Fe}} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{1 \text{ mol Fe}_2\text{O}_3} \times 159.70 \text{ g Fe}_2\text{O}_3 = 38.2 \text{ g Fe}_2\text{O}_3$$

7. How many moles of H_3PO_4 are produced when 21.0 g P_4O_{10} reacts completely to form H_3PO_4 ?



21.0 g

x mol

$$\frac{21.0 \text{ g P}_4\text{O}_{10}}{283.88 \text{ g P}_4\text{O}_{10}} \times \frac{1 \text{ mol P}_4\text{O}_{10}}{1 \text{ mol P}_4\text{O}_{10}} \times \frac{4 \text{ mol H}_3\text{PO}_4}{1 \text{ mol P}_4\text{O}_{10}} = 0.296 \text{ mol H}_3\text{PO}_4$$

8. How many grams of H_3PO_4 are produced when 30.0 moles of water react with an excess of P_4O_{10} ?



30.0 mol x g

$$\frac{30.0 \text{ mol H}_2\text{O}}{6 \text{ mol H}_2\text{O}} \times \frac{4 \text{ mol H}_3\text{PO}_4}{1 \text{ mol H}_3\text{PO}_4} \times 98.00 \text{ g H}_3\text{PO}_4 = 1960 \text{ g H}_3\text{PO}_4 \text{ OR } 1.96 \times 10^3 \text{ g H}_3\text{PO}_4$$

limiting

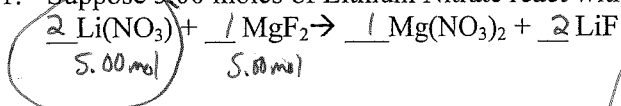
9. When two substances react to form products, the reactant which is used up is called the ____.
10. Which branch of chemistry deals with the mass relationships of elements in compounds and the mass relationships among reactants and products in chemical reactions?
- qualitative analysis
 - entropy
 - chemical kinetics
 - d stoichiometry

Option A - take both reactants to same product, \rightarrow LiNO_3 makes less so it is LR

$$\frac{5.00 \text{ mol LiNO}_3}{2 \text{ mol LiNO}_3} = 5.00 \text{ mol LiF}$$

$$\frac{5.00 \text{ mol MgF}_2}{1 \text{ mol MgF}_2} = 10.0 \text{ mol LiF}$$

11. Suppose 5.00 moles of Lithium Nitrate react with 5.00 moles of Magnesium Fluoride react according to:



Option B one reactant to other

$$\frac{5.00 \text{ mol LiNO}_3}{2 \text{ mol LiNO}_3} = 2.50 \text{ mol MgF}_2$$

Need 2.50 mol MgF_2 , it is excess since you have 5.00 mol MgF_2

OR

$$\frac{5.00 \text{ mol MgF}_2}{1 \text{ mol MgF}_2} = 5.00 \text{ mol LiNO}_3$$

Need 10.0 mol LiNO_3 , you only have 5.00 mol LiNO_3 so it is LR

The limiting reagent is:

- a. Lithium Fluoride
- b. Magnesium Nitrate

- c. Lithium Nitrate
- d. Magnesium Fluoride

B

12. A chemical equation is balanced when the
- a. coefficients of the reactants equal the coefficients of the products.
 - b. same number of each kind of atom appears in the reactants and in the products.
 - c. products and reactants are the same chemicals.
 - d. subscripts of the reactants equal the subscripts of the products.

1:2

13. In the reaction represented by the equation $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, what is the mole ratio of nitrogen to ammonia?

4:3

14. In the reaction represented by the equation $2\text{Al}_2\text{O}_3 \rightarrow 4\text{Al} + 3\text{O}_2$, what is the mole ratio of aluminum to oxygen?

15. In the equation $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$, how many moles of oxygen are produced when 3.0 mol of KClO_3 decompose completely?

$$\frac{3.0 \text{ mol KClO}_3}{2 \text{ mol KClO}_3} \times \frac{3 \text{ mol O}_2}{3 \text{ mol O}_2} = 4.5 \text{ mol O}_2$$

- a. 1.0 mol
- b. 2.5 mol
- c. 3.0 mol
- d. 4.5 mol

16. For the reaction represented by the equation $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$, how many moles of nitrogen are required to produce 18 mol of ammonia?

$$\frac{18 \text{ mol NH}_3}{2 \text{ mol NH}_3} \times \frac{1 \text{ mol N}_2}{2 \text{ mol N}_2} = 9.0 \text{ mol N}_2$$

17. For the reaction represented by the equation $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$, how many grams of chlorine gas are required to react completely with 3.00 mol of sodium?

$$\frac{3.00 \text{ mol Na}}{2 \text{ mol Na}} \times \frac{1 \text{ mol Cl}_2}{1 \text{ mol Cl}_2} \times 70.90 \text{ g Cl}_2 = 106 \text{ g Cl}_2$$

limiting
limiting
D

18. Which reactant controls the amount of product formed in a chemical reaction?
19. A chemical reaction involving substances A and B stops when B is completely used. B is the
20. When the limiting reactant in a chemical reaction is completely used, the
- a. excess reactants begin combining.
 - b. reaction slows down.
 - c. reaction speeds up.
 - d. reaction stops.

C

21. To determine the limiting reactant in a chemical reaction, one must know the
- a. available amount of one of the reactants.
 - b. amount of product formed.
 - c. available amount of each reactant.
 - d. speed of the reaction.

theoretical yield

22. What is the maximum possible amount of product obtained in a chemical reaction?

23. For the reaction represented by the equation $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$, calculate the percentage yield if 500. g of sulfur trioxide react with excess water to produce 575 g of sulfuric acid.

$$\frac{500 \text{ g SO}_3}{80.06 \text{ g SO}_3} \times \frac{1 \text{ mol SO}_3}{1 \text{ mol SO}_3} \times \frac{1 \text{ mol H}_2\text{SO}_4}{1 \text{ mol H}_2\text{SO}_4} \times 98.08 \text{ g H}_2\text{SO}_4 = 613 \text{ g H}_2\text{SO}_4$$

$$\frac{\text{actual}}{\text{theor.}} \times 100 = \frac{575}{613} \times 100 = 93.8\%$$