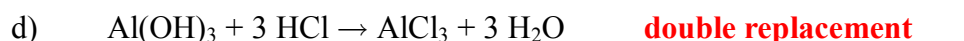
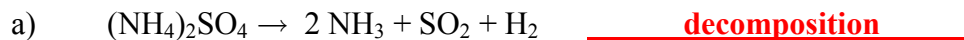


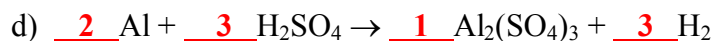
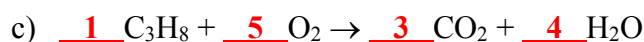
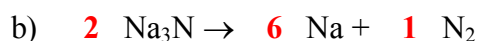
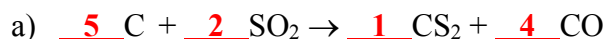
REVIEW QUESTIONS

Chapter 6

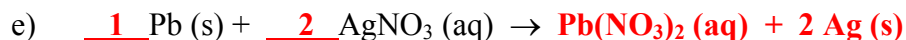
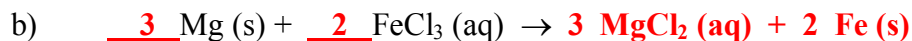
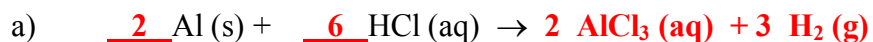
1. Classify the type of each of the following reactions:



2. Balance each of the equations shown below:



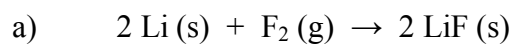
3. Predict the products for each reaction and balance the equation. If no reaction occurs, write "No Reaction" after the arrow:



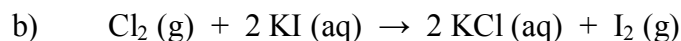
4. Identify each reaction below as oxidation or reduction:



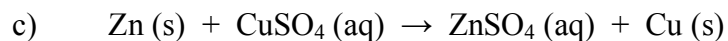
5. In the following reactions, identify which reactant is oxidized and which is reduced:



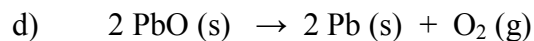
oxidized: Li reduced: F₂



oxidized: I⁻ reduced: Cl₂



oxidized: Zn reduced: Cu²⁺



oxidized: O²⁻ reduced: Pb²⁺

6. Calculate each of the following quantities:

a) Number of moles in 112 g of aspirin, $C_9H_8O_4$

$$\text{Molar mass} = [9(12.0) + 8(1.01) + 4(16.0)] = 180.1 \text{ g/mol}$$

$$\text{Moles} = 112 \text{ g} \times \frac{1 \text{ mol}}{180.1 \text{ g}} = 0.622 \text{ mol} \quad (3 \text{ sig figs})$$

b) Mass of 3.82 moles of silver acetate, $AgC_2H_3O_2$

$$\text{Molar mass} = [107.9 + 2(12.0) + 3(1.01) + 2(16.0)] = 166.9 \text{ g/mol}$$

$$\text{Mass} = 3.82 \text{ mol} \times \frac{166.9 \text{ g}}{1 \text{ mol}} = 638 \text{ g} \quad (3 \text{ sig figs})$$

c) Number of molecules in 1.75 moles of CO_2

$$\text{Molar mass} = 12.0 + 2(16.2) = 44.0 \text{ g/mol}$$

$$\# \text{ of } CO_2 \text{ molecules} = 1.75 \text{ mol } CO_2 \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 1.05 \times 10^{24} \text{ molecules} \quad (3 \text{ sig figs})$$

d) Number of mole of H atoms in 20.0 g of CH_4

$$\text{Molar mass} = 12.0 + 4(1.01) = 16.0 \text{ g/mol}$$

$$\# \text{ of } CH_4 \text{ molecules} = 20.0 \text{ g } CH_4 \times \frac{1 \text{ mol}}{16.0 \text{ g}} \times \frac{4 \text{ mol H atoms}}{1 \text{ mol } CH_4} = 5.00 \text{ mol H atoms} \quad (3 \text{ sig figs})$$

7. Use the equation below to determine the mole ratios below:



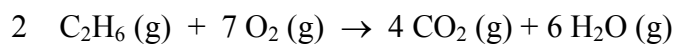
A) $\frac{\text{mol NH}_3}{\text{mol H}_2\text{O}} = \frac{2}{6} = \frac{1}{3}$

C) $\frac{\text{mol H}_2\text{O}}{\text{mol CH}_4} = \frac{6}{2} = 3$

B) $\frac{\text{mol HCN}}{\text{mol O}_2} = \frac{2}{3}$

D) $\frac{\text{mol O}_2}{\text{mol H}_2\text{O}} = \frac{3}{6} = \frac{1}{2}$

Use the reaction shown below to answer the next 3 questions:



8. How many moles of water can be produced when 1.8 moles of C_2H_6 are used?

$$1.8 \text{ mol C}_2\text{H}_6 \times \frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol C}_2\text{H}_6} = 5.4 \text{ mol H}_2\text{O}$$

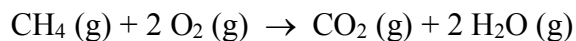
9. How many moles of CO_2 are produced when 25.0 g of oxygen are consumed?

$$25.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.0 \text{ g O}_2} \times \frac{4 \text{ mol CO}_2}{7 \text{ mol O}_2} = 0.446 \text{ mol CO}_2$$

10. How many grams of water is produced when 78.0 g of C_2H_6 are burned?

$$78.0 \text{ g C}_2\text{H}_6 \times \frac{1 \text{ mol C}_2\text{H}_6}{30.06 \text{ g C}_2\text{H}_6} \times \frac{6 \text{ mol H}_2\text{O}}{2 \text{ mol C}_2\text{H}_6} \times \frac{18.0 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 140. \text{ g H}_2\text{O}$$

11. In the reaction shown below, if 10.0 g of CH₄ is combined with 30.0 g of O₂, what is maximum amount of CO₂ that can be produced?



Assume CH₄ is LR:

$$10.0 \text{ g CH}_4 \times \frac{1 \text{ mol CH}_4}{16.04 \text{ g CH}_4} \times \frac{1 \text{ mol CO}_2}{1 \text{ mol CH}_4} = 0.623 \text{ mol CO}_2$$

Assume O₂ is LR:

$$30.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.0 \text{ g O}_2} \times \frac{1 \text{ mol CO}_2}{2 \text{ mol O}_2} = 0.469 \text{ mol CO}_2$$

The second assumption is correct. Therefore, oxygen is the limiting reactant

$$0.469 \text{ mol CO}_2 \times \frac{44.0 \text{ g}}{1 \text{ mol}} = 20.6 \text{ g CO}_2$$

12. In an experiment with Zn and S, it was found that 30.7 g of ZnS was produced. If the percent yield of the reaction was 93.7%, what is the theoretical yield of this reaction?

Actual yield = 30.7 g

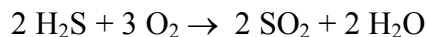
Theoretical yield = ???

Percent yield = 93.7

$$\% \text{ yield} = \frac{\text{Actual yield}}{\text{Theoretical yield}}$$

$$\text{Theoretical yield} = \frac{\text{Actual yield}}{\% \text{ yield}} = \frac{30.7 \text{ g}}{0.937} = 32.8 \text{ g}$$

13. How many grams of SO₂ can be produced from reaction of 10.0 g of H₂S and 10.0 g of O₂, as shown below:



Assume H₂S is LR:

$$10.0 \text{ g H}_2\text{S} \times \frac{1 \text{ mol H}_2\text{S}}{34.1 \text{ g H}_2\text{S}} \times \frac{2 \text{ mol SO}_2}{2 \text{ mol H}_2\text{S}} = 0.293 \text{ mol SO}_2$$

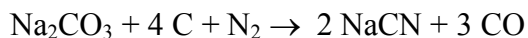
Assume O₂ is LR:

$$10.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.0 \text{ g O}_2} \times \frac{2 \text{ mol SO}_2}{3 \text{ mol O}_2} = 0.208 \text{ mol SO}_2$$

The second assumption is correct. Therefore, oxygen is the limiting reactant.

$$0.208 \text{ mol SO}_2 \times \frac{64.1 \text{ g}}{1 \text{ mol}} = 13.3 \text{ g SO}_2$$

14. When 50.0 g of N₂ is reacted with an excess of other reactants as shown below, 20.0 g of NaCN was produced. What is the percent yield of this reaction?



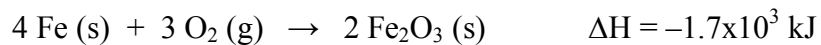
Calculate the theoretical yield:

$$50.0 \text{ g N}_2 \times \frac{1 \text{ mol N}_2}{28.0 \text{ g N}_2} \times \frac{2 \text{ mol NaCN}}{1 \text{ mol N}_2} \times \frac{49.0 \text{ g NaCN}}{1 \text{ mol NaCN}} = 175 \text{ g NaCN}$$

Calculate the percent yield:

$$\% \text{ yield} = \frac{\text{Actual yield}}{\text{Theoretical yield}} \times 100 = \frac{20.0 \text{ g}}{175 \text{ g}} \times 100 = 11.4 \%$$

15. The formation of Fe₂O₃ from iron and oxygen gas releases 1.7x10³ kJ of heat, as shown below:



a) How many kJ are released when 2.00 g of Fe react?

$$2.00 \text{ g Fe} \times \frac{1 \text{ mol Fe}}{55.85 \text{ g Fe}} \times \frac{1.7 \times 10^3 \text{ kJ}}{4 \text{ mol Fe}} = 15.2 \text{ kJ}$$

b) How many grams of Fe₂O₃ are produced when 475 kJ of heat are released?

$$475 \text{ kJ} \times \frac{2 \text{ mol Fe}_2\text{O}_3}{1.7 \times 10^3 \text{ kJ}} \times \frac{159.7 \text{ g}}{1 \text{ mol Fe}_2\text{O}_3} = 89.2 \text{ g Fe}_2\text{O}_3$$