Chapter 3 Homework

Class:_____ **Number:**_____ **Name:**_____

____ 1. What scientific law requires that subscripts in formulas should never be changed while balancing a chemical equation?

a. Law of Multiple Proportions **b. Law of Definite Proportions**
c. Law of Conservation of Matter **d. Law of Conservation of Matter and Energy**
e. Law of Conservation of Energy

____ 2. Balance the following equation with the **smallest whole number coefficients**. What is the coefficient for O_2 in the balanced equation?

$C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$

a. 9 b. 5 c.15 d.6 e.13

____ 3. Balance the following equation with the **smallest whole number coefficients**. What is the coefficient for NH_3 in the balanced equation?

$Fe(NO_3)_3 + NH_3 + H_2O \rightarrow Fe(OH)_3 + NH_4NO_3$

a. 1 b. 3 c. 2 d. 6 e. 4

____ 4. Elemental phosphorus is produced from calcium phosphate in the following reaction. What is the coefficient for C when this equation is balanced with the **smallest whole number coefficients**?

$Ca_3(PO_4)_2 + SiO_2 + C \rightarrow P_4 + CO + CaSiO_3$

a. 10 b. 3 c. 1 d. 6 e. 4

____ 5. When heated lead nitrate decomposes according to the following equation. What is the coefficient for NO_2 when the this equation is balanced with the **smallest whole number coefficients**?

$Pb(NO_3)_2 \rightarrow PbO + O_2 + NO_2$

a. 1 b. 2 c. 3 d. 4 e.5

____ 6. Balance the following equation with the **smallest whole number coefficients**. Choose the answer that is the sum of the coefficients in the balanced equation. Do not forget coefficients of "one".

$Na_2O + P_4O_{10} \rightarrow Na_3PO_4$

a. 5 b. 8 c. 9 d. 10 e. 11

____ 7. How many moles of O_2 are required to burn completely 63.5 g of C_6H_6, according to the following equation?

$2C_6H_6 + 15O_2 \rightarrow 12CO_2 + 6H_2O$

a. 0.814 b. 12.2 c. 6.1 d. 0.109 e. 9.21

____ 8. How many moles of H_2O will be produced from the complete combustion of 2.4 grams of CH_4?

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

a. 0.15 b. 0.30 c. 1.5 d. 3.0 e. 6.0

____ 9. How many grams of oxygen are required to burn 0.10 mole of C_3H_8?

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

a. 8.0 g b. 12 g c. 16 g d. 32 g e. 64 g

____ 10. If sufficient acid is used to react completely with 72.9 g of magnesium, how much hydrogen will be produced?

$2HCl + Mg \rightarrow MgCl_2 + H_2$

a. 4.5 g b. 3.0 mol c. 1.5 mol d. 9.0 g e. 6.0 mol

____ 11. What mass of phosphoric acid, H_3PO_4, would actually react with 7.17 grams of LiOH?

$3LiOH + H_3PO_4 \rightarrow Li3PO_4 + 3H_2O$

a. 3.27 g b. 6.53 g c. 9.80 g d. 19.6 g e. 29.4 g

____ 12. What mass of SiF_4 could be produced by the reaction of 15 g of SiO_2 with an excess of HF? The equation for the reaction is:

$SiO_2 + 4HF \rightarrow SiF_4 + 2H_2O$

a. 1.04 g b. 12 g c. 26 g d. 104 g e. 52 g

____ 13. What mass of Li_3PO_4 can be prepared from the complete reaction of 7.17 grams of LiOH with a stoichiometric amount of H_3PO_4?

$3LiOH + H_3PO_4 \rightarrow Li_3PO_4 + 3H_2O$

a. 9.80 g b. 9.34 g c. 9.61 g d. 10.4 g e. 11.6 g

____ 14. A mixture of calcium oxide, CaO, and calcium carbonate, $CaCO_3$, that had a mass of 3.454 g was heated until all the calcium carbonate was decomposed according to the following equation. After heating, the sample had a mass of 3.102 g. Calculate the mass of $CaCO_3$ present in the original sample.

$CaCO_3$ (solid) $\rightarrow$ CaO (solid) + CO_2 (gas)

a. 0.400 g b. 0.800 g c. 1.00 g d. 1.60 g e. 0.200 g

____ 15. How many moles of carbon dioxide could be produced if 10 moles of octane, C_8H_{18}, are combined with 20 moles of oxygen?

$C_8H_{18} + 25O_2 \rightarrow 16CO_2 + 18H_2O$

a. 40 mol b. 8.0 mol c. 12.8 mol d. 62.5 mol e. 20 mol

____ 16. What is the percent yield of elemental sulfur if 7.54 grams of sulfur are obtained from the reaction of 6.16 grams of SO_2 with an excess of H_2S?

$2H_2S + SO_2 \rightarrow 2H_2O + 3S$

a. 72.6% b. 40.8% c. 81.5% d. 88.4% e. 91.4%

____ 17. If 6.6 g of fluorine reacts with 5.6 g chlorine to produce 8.5 g of chlorine trifluoride, what is the limiting reactant and the percent yield of chlorine trifluoride?

$Cl_2 + 3F_2 \rightarrow 2ClF_3$

a. F_2, 45% b. Cl_2, 58% c. Cl_2, 53% d. F_2, 69% e. F_2, 79%

____ 18. What volume of 40.0% NaNO3 solution contains 0.15 mole of NaNO3? Density = 1.32 g/mL.

a. 42.0 mL b. 3.86 mL c. 9.60 mL d. 24.1 mL e. 38.2 mL

____ 19. The molarity of a solution is defined as

a. the number of moles of solute per kilogram of solvent.
b. the number of moles of solute per liter of solution.
c. the number of equivalent weights of solute per liter of solution.
d. the number of moles of solute per kilogram of solution.
e. the number of moles of solute per liter of solvent.

____ 20. What volume of 0.365 M NaOH solution contains 53.4 g NaOH?

a. 3.66 L b. 2.05 L c. 146 L d. 19.5 L e. 14.6 L

____ 21. Calculate the molarity of the resulting solution if enough water is added to 50.0 mL of 4.20 *M* NaCl solution to make a solution with a volume of 2.80 L.

a. 75.0 *M* b. 0.043 *M* c. 33.1 *M* d. 0.067 *M* e. 0.0750 *M*

____ 22. Calculate the resulting molarity of a solution prepared by mixing 25.0 mL of 0.160 *M* NaBr and 55.0 mL of 0.0320 *M* NaBr.

a. 0.522 *M* b. 0.272 *M* c. 0.230 *M* d. 0.0658 *M* e. 0.0720 *M*

____ 23. How many grams of KOH are contained in 400. mL of 0.250 *M* KOH solution?

a. 12.4 g b. 5.61 g c. 89.8 g d. 35.1 g e. 8.98 g

____ 24. How many grams of $PbCl_2$ precipitate if 100. mL of 0.150 M LiCl solution reacts with an excess of $Pb(NO_3)_2$ solution?

$2\ LiCl + Pb(NO_3)_2 \rightarrow PbCl_2 + 2\ LiNO_3$

a. 2.09 g b. 8.34 g c. 13.9 g d. 4.17 g e. 92.7 g

____ 25. What is the **molarity** of a solution prepared by dissolving **1000. g** of sodium phosphate, **Na_3PO_4**, in water and diluting to **3.00 liters**? (atomic weights: Na = 22.99, P = 30.97, O = 16.00)

a. 4.76 *M* b. 0.493 *M* c. 2.03 *M* d. 6.10 *M*

Chapter 3
Answer Section

MULTIPLE CHOICE

1. ANS: B PTS: 1 TOP: Chemical Equations
2. ANS: E PTS: 1 TOP: Chemical Equations
3. ANS: B PTS: 1 TOP: Chemical Equations
4. ANS: A PTS: 1 TOP: Chemical Equations
5. ANS: D PTS: 1 TOP: Chemical Equations
6. ANS: E PTS: 1 TOP: Chemical Equations
7. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
8. ANS: B PTS: 1 TOP: Calculations Based on Chemical Equations
9. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
10. ANS: B PTS: 1 TOP: Calculations Based on Chemical Equations
11. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
12. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
13. ANS: E PTS: 1 TOP: Calculations Based on Chemical Equations
14. ANS: B PTS: 1 DIF: * Harder Question
    TOP: Calculations Based on Chemical Equations
15. ANS: C PTS: 1 TOP: The Limiting Reactant Concept
16. ANS: C PTS: 1 TOP: Percent Yields from Chemical Reactions
17. ANS: E PTS: 1 TOP: Percent Yields from Chemical Reactions
18. ANS: D PTS: 1 TOP: Concentrations of Solutions
19. ANS: B PTS: 1 TOP: Concentrations of Solutions
20. ANS: A PTS: 1 TOP: Concentrations of Solutions
21. ANS: E PTS: 1 TOP: Dilution of Solutions
22. ANS: E PTS: 1 DIF: * Harder Question
    TOP: Dilution of Solutions
23. ANS: B PTS: 1 TOP: Using Solutions in Chemical Reactions
24. ANS: A PTS: 1 TOP: Using Solutions in Chemical Reactions
25. ANS: C PTS: 1 TOP: Additional Questions