Chemistry 11 Review

Do not forget Significant digits and units

Name: Key

1. Differentiate between atomic mass and the molecular mass

atomic – mass of an atom of an element

molecular – mass of a molecule of a compound

2. How many significant figures are in each of the following:

a 85.0	3	e 1.004	4
b 0.03506	4	f 10.030	5
c 5400	2	g 100	1
d 3.20×10^8	3	h 1000.	4

3. Calculate the number of carbon atoms in 12.0 g of carbon?

$$12.0\,g\left(\frac{1\,mol}{12.0\,g}\right)\left(\frac{6.02\times10^{23}\,atoms}{mol}\right) = 6.02\times10^{23}\,atoms$$

4. Classify the reaction:

$Fe + 3CuCl \longrightarrow 3Cu + FeCl_3 + heat$

exothermic single replacement

5. Balance the following equation resulting from the combustion of pentane:

$1\,C_5H_{12} + 8\,O_2 \longrightarrow 5\,CO_2 + 6\,H_2O$

6. The following data were obtained from a chemical analysis:

Carbon 38.7% Hydrogen 9.7% Oxygen 51.6%

The empirical formula for the compound is...

a. CHO b. CH_2O c. CH_3O d. CH_4O e. CH_5O

see attached for work below

7. A piece of copper wire is left overnight in a 0.25M solution of silver nitrate. The solution turns blue in colour [from the copper (II) ion], and silver metal is deposited in the flask. Calculate the minimum amount of copper wire needed to produce 27 g of silver in the flask?

$Cu + 2AgNO_3 \rightarrow 2Ag + Cu(NO_3)_2$

$$27\,g\,Ag\left(\frac{mol}{107.9\,g}\right) = 0.25\,mol\,Ag\left(\frac{1\,mol\,Cu}{1\,mol\,Ag}\right) = 0.125\,mol\,Cu\left(\frac{63.5\,g}{mol}\right) = 7.9\,g \text{ or } 0.13\,mol\,Cu$$

8. Calculate the number of moles of a gas that will occupy a 5.00 L flask at 150. kPa and 20.0 °C is (R = 8.31 L kPa/K mol)?

$$n = \frac{PV}{RT} = \frac{150.\,kPa\,(5.00\,L)}{8.31\,(293\,K)} = 0.308\,mol$$

9. Calculate the number of grams of KNO_3 required to make 1.00 L of a 0.400 M KNO_3 solution?

$mol = M \times L$

$= 0.400\,M\,(1.00\,L)$

$= 0.400\,mol$

$$0.400\,mol\left(\frac{101.1\,g}{mol}\right) = 40.4\,g$$

10. 2.00 L of 12.0 M HCl is diluted to 6.00 L. What is the new HCl solution concentration?

$M_BV_B = M_AV_A$ $\quad M_A = \frac{12.0M(2.00L)}{6.00L}$

4.00 M

11. Of the following elements, the most reactive would be...
a. Li b. Na c. Cs d. Be e. Ra

bottom left

12. You have 120 mL of a 0.40 M $MgSO_4$ solution. What is the amount of water that must be added to make this a 0.10 M $MgSO_4$ solution?

$V_A = \frac{0.120L(0.40M)}{0.10M}$ $\quad .48 - .12 = 0.36$

$= 0.48L$

0.36 L of H_2O

13. The correct formula for the compound diphosphorous tetroxide is...
a. PO_2 b. PO_4 c. $P(O_4)2$ d. P_2O_4 e. 2PO

14. $2AgNO_{3(aq)} + CaCl_{2(aq)} \longrightarrow 2AgCl_{(s)} + Ca(NO_3)_{2(aq)}$

This equation represents the reaction of aqueous silver nitrate and aqueous calcium chloride to produce silver chloride which is insoluble in water (calcium nitrate is soluble in water). What isthe net ionic equation for this precipitation reaction?

a. $2Ag^+ (aq) + 2NO_3^- (aq) + Ca^{2+} (aq) + 2Cl^- (aq) \longrightarrow 2AgCl (s) + Ca(NO_3)_2 (aq)$

b. $Ca^{2+} (aq) + 2NO_3^- (aq) \longrightarrow Ca(NO_3)_2 (aq)$

c. $2Ag^+ (aq) + 2Cl^- (aq) \longrightarrow 2AgCl (s)$

d. $2Ag^+ (aq) + 2NO_3^- (aq) \longrightarrow AgNO_3 (s)$

e. $Ca^{2+} (aq) + 2Cl^- (aq) \longrightarrow CaCl_2 (s)$

15. 5.0 g of HCl (aq) are reacted with 5.0 g of KOH (aq), calculate the mass of H_2O (l) formed? Limiting reactant

$HCl + KOH \rightarrow HOH + KCl$

0.089 0.14 0.089

$5g\left(\frac{mol}{36.5g}\right) = 0.13699\ mol\ HCl$

$5g\left(\frac{mol}{56.1g}\right) = 0.08913\ mol\ KOH$

$0.089\ mol\ H_2O\left(\frac{18.0g}{mol}\right) =$

1.6g H_2O

16. If 42.26 mL of a 0.362 M NaOH solution are need to neutralize 50.00 mL of a HCl solution in an acid-base titration, what is the molarity of the acid?

$NaOH + HCl \rightarrow HOH + NaCl$

$NaOH \rightarrow mol = M \times L$

$= 0.362M(0.04226)$

$= 0.015298\ mol\ NaOH$

0.306 M HCl

$M = \frac{mol}{L} = \frac{0.015298\ mol}{0.05L} = 0.30596$

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6)

	g	mole	÷ 3.225	Rounded
C	38.7	3.225	1.000	1
H	9.7	9.7	3.00	3
O	51.6	3.225	1.000	1

$\therefore CH_3O$