

Name: ANSWERS

Date: _____

BCI SCIENCE**Grade 11 Chemistry Review****SCH 4U**

Stuff you will need to remember somewhat for grade 12

(You will need to do most of the work on a separate piece of paper)

1. SIGNIFICANT DIGITS

i) Determine the number of significant digits in each of the following:

a) 6.571 g 4

c) 2500 m 2

e) 30.07 g 4

b) 0.157 kg 3

d) 0.0700000 g 6

f) 0.106 cm 3

ii) Do the Following Calculations Using Scientific Notation and Using Correct Significant Figures:

g) $25.37 + 6.850 + 15.07 + 8.056$ h) $27.68 - 14.369$ i) $3.15 \times 2.5 \times 4.00$ j) $40.8 / 5.05$ **55.35****13.31****32****8.08****2. STRUCTURE AND PROPERTIES OF MATTER**a) Calculate the number of protons, neutrons, and electrons for $^{213}_{82}\text{Pb}^{+4}$ $p^+ = 82$, $n^0 = 131$, $e^- = 78$

b) Specifically explain the ranking of the following atoms from biggest to smallest atomic radius: Na, Mg, Ca
 $\text{Ca} > \text{Na} > \text{Mg}$. Ca has the largest A.R. b/c it has 2 valence electrons in the 4th (largest) energy level. Na is next largest b/c its valence e^- experience less Z_{eff} (pull from the nucleus) since it only has 11 protons in its' nucleus. Mg is smallest because its' valence electrons are in the third energy level and experience more Z_{eff} b/c they are pulled by 12 p^+ making the AR smaller.

c) Specifically explain the ranking of the following atoms from biggest to smallest ionization energy: N, O, S
 N and O have higher IE than S b/c the valence e^- are located in $n=3$ and therefore the nucleus has a greater pull on each e^- which will require more energy to remove them. (Nitrogen actually has the highest IE vs O which we will discuss it later in the unit).

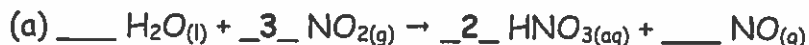
3. NAMING

Complete the following chart

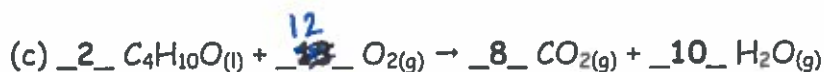
Formula	Name	Formula	Name
a) He	helium gas	F_2	i) fluorine gas
b) AlBr_3	aluminum bromide	Na_2S	j) sodium sulphide
c) CuO	copper(II)oxide or cupric oxide	CuCl	k) copper(I)chloride
d) $\text{Sr}_3(\text{PO}_4)_2$	strontium phosphate	$\text{K}_2\text{Cr}_2\text{O}_7$	l) potassium dichromate
e) FrNO_4	francium pernitrate	$\text{Ni}_2(\text{SO}_3)_3$	m) nickel(III)hyposulphite
f) $\text{HCl}_{(\text{aq})}$	hydrochloric acid	SnF_2	n) stannous fluoride
g) $\text{H}_2\text{SO}_{4(\text{aq})}$	sulphuric acid	SBr_6	o) sulphur hexabromide
h) $\text{HClO}_{(\text{aq})}$	hypochlorous acid	Hg_3N_2	p) mercuric nitride

4. BALANCING AND TYPES OF REACTIONS

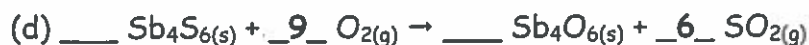
Balance and then identify each type of equation.

TYPE: double
displacement

TYPE: synthesis



TYPE: combustion



TYPE: combustion



TYPE: double displacement

5. CHEMICAL QUANTITIES

Answer each of the following questions on a piece of paper.

- (a) What mass of propane, $C_3H_8(g)$, reacting completely with excess oxygen, is required to produce 26.7 g of carbon dioxide gas?



$m = ?$

$$n = \frac{m}{M}$$

$$\frac{3 \text{ mol } CO_2}{0.6067 \text{ mol}} = \frac{1 \text{ mol } C_3H_8}{x}$$

$m = nM$

$$n = \frac{26.7 \text{ g}}{44.01 \text{ g/mol}}$$

$$x = 0.2022 \text{ mol}$$

$$m = (0.2022)(44.09)$$

$$n = 0.6067 \text{ mol}$$

$$m = 44.09 \text{ g}$$

*** 44.09 g of propane is required to produce 26.7 g of $CO_{2(g)}$**

8.92 g

- (b) Examine the following reaction.



- i) When 2.50 g of SrH_2 is reacted with 8.03×10^{22} molecules of water, what is the limiting reagent?

$$n = \frac{m}{M}$$

$$n = \frac{N}{N_A}$$

$$\frac{1 \text{ mol } SrH_2}{0.0278 \text{ mol}} = \frac{1 \text{ mol } Sr(OH)_2}{x}$$

$$\frac{2 \text{ mol } H_2O}{0.1334 \text{ mol}} = \frac{1 \text{ mol } Sr(OH)_2}{y}$$

$$n = \frac{2.50}{89.78}$$

$$n = \frac{8.03 \times 10^{22}}{6.02 \times 10^{23}}$$

$$x = 0.0278 \text{ mol } Sr(OH)_2$$

$$y = 0.0667 \text{ mol } Sr(OH)_2$$

$$n = 0.0278 \text{ mol } n = 0.1334 \text{ mol}$$

*** SrH_2 is the limiting reagent.**

- ii) What mass of strontium hydroxide will be produced?

$m = nM$

$$m = (0.0278)(121.63)$$

$$m = 3.38 \text{ g}$$

*** 3.38 g of $Sr(OH)_2$ will be produced.**

6. SOLUTIONS AND SOLUBILITY

Answer each of the following questions on a piece of paper.

- (a) What is the molar concentration of the solution made by dissolving 1.00 g of solid sodium nitrate in enough water to make 315 mL of solution?

$$n = \frac{m}{M}$$

$$n = 0.01177 \text{ mol}$$

$$C = \frac{0.01177 \text{ mol}}{0.315 \text{ L}}$$

$$n = \frac{1.00}{84.99}$$

$$C = \frac{n}{V}$$

$$C = 0.0374 \text{ M}$$

*** the molar concentration of the solution is 0.0374 M.**

- (b) By the addition of water, 80.0 mL of 4.00 mol/L sulfuric acid is diluted to 400.0 mL. What is the molar concentration of the sulfuric acid after dilution?

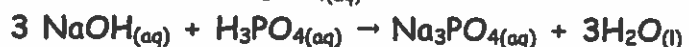
$$C_2 = \frac{C_1 V_1}{V_2} \quad C_2 = 0.80M$$

$$C_2 = \frac{(4.00M)(0.080L)}{0.400L} \quad \text{** the } [H_2SO_{4(aq)}] \text{ is } 0.80M$$

- (c) Write the balanced molecular and net-ionic equations for the following reaction:



- (d) In a titration, 50.0 mL of 0.0800 mol/L $NaOH_{(aq)}$ is titrated by a 0.0500 mol/L $H_3PO_{4(aq)}$ solution. What volume of $H_3PO_{4(aq)}$ must be added to neutralize the $NaOH$?



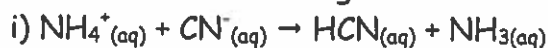
$$n = CV \quad V = ? \quad \frac{3molNaOH}{0.004mol} = \frac{1molH_3PO_4}{x} \quad V = \frac{n}{C}$$

$$n = (0.0800)(0.050) \quad x = 0.00133mol H_3PO_4 \quad V = \frac{0.00133}{0.0500}$$

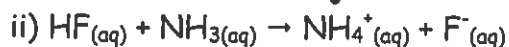
$$n = 0.004mol \quad V = 0.0267L$$

** 26.7 mL of H_3PO_4 must be added to neutralize the solution.

- (e) For each of the following reactions identify the acid, base, conjugate-acid, conjugate-base



acid base conj acid conj base



acid base conj acid conj base

7. GASES AND ATMOSPHERIC CHEMISTRY

Answer each of the following questions on a piece of paper.

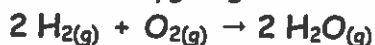
- (a) One litre of a certain gas has a mass of 2.05 g at SATP. What is the molar mass of this gas?

$$n = \frac{PV}{RT} \quad n = 0.0404mol \quad M = \frac{2.05g}{0.0404mol}$$

$$n = \frac{(100kPa)(1L)}{(8.314)(298K)} \quad M = \frac{m}{n} \quad M = 50.79g/mol$$

** the molar mass of the gas is 50.79g/mol.

- (b) When a spark ignites a mixture of hydrogen gas and oxygen gas, water vapour is formed. What mass of oxygen gas would be required to react completely with 1.00 g of hydrogen?



$$n = \frac{m}{M} \quad \frac{2molH_2}{0.4961mol} = \frac{1molO_2}{x} \quad m = nM$$

$$n = \frac{1.00g}{2.016g/mol} \quad x = 0.248mol O_2 \quad m = (0.248)(31.998)$$

$$n = 0.4961mol \quad m = 7.94g$$

** 7.94g of O_2 is required to completely react with 1.00g of H_2 .

