BLUEVALE COLLEGIATE INSTITUTE

80/80

Grade: 12   Date: June 20, 2012   Time: 12:00 pm.   Length of Exam: 75 minutes

Course Teacher: Mr. Arthur

Name: **ANSWERS**

Grade 12 College Chemistry - SCH 4CI PRACTICE EXAM

The following information may be useful:

1 mole = 6.023×10^{23} units $n = \dfrac{m}{M}$ $\dfrac{m}{M \mid n}$ $c = \dfrac{n}{V}$ $\dfrac{n}{c \mid V}$ $C_1V_1 = C_2V_2$ % yield = $\dfrac{actual\ yield}{theoretical\ yield} \times 100\%$

$\dfrac{N}{n \mid N_A}$ $P_1V_1 = P_2V_2$ $\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}$ $\dfrac{P_1}{T_1} = \dfrac{P_2}{T_2}$ pH = $-\log[H_3O^+]$ $[H_3O^+] = 10^{-pH}$

Part A: Multiple Choice/True or False - 40 Marks
Circle <u>the best possible</u> answer on this page and then transfer onto the scantron card provided.

1. **Which of the following is an inference?**
   (a) The chalk's texture is smooth.
   (b) The temperature decreased because ice was added
   (c) The gum tastes sweet.
   (d) Black flakes were produced when heated.

2. **Which is a quantitative observation?**
   (a) 5 mL of gas formed.
   (b) The aluminium foil is lustrous.
   (c) The gum is pink.
   (d) A yellow precipitate formed.

3. **A cation is:**
   (a) a neutral particle.
   (b) a negatively charged particle.
   (c) a positively charged particle.
   (d) another term for an atom.

4. **Which is a chemical change?**
   (a) grinding a solid into a powder
   (b) a candle burning
   (c) dissolving sugar into water
   (d) ice melting

5.

   The above WHMIS symbol identifies:
   (a) materials causing immediate toxic effects.
   (b) materials causing other toxic effects.
   (c) biohazardous infectious materials.
   (d) corrosive materials.

6. **A magnesium atom will _____ to form its ion which has the formula: _____.**
   (a) lose two electrons; Mg^{2+}
   (b) lose one electron; Mg^{1+}
   (c) gain one electron; Mg^{1-}
   (d) gain two electrons; Mg^{2-}

7. **Who discovered the proton?**
   (a) Rutherford   (b) Thomson
   (c) Bohr   (d) Democritus

8. **The "Billiard Ball" model of atoms was proposed by:**
   (a) Thomson.   (b) Rutherford.
   (c) Bohr.   **(d) Dalton.**

9. **Outside the nucleus contains:**
   (a) protons only.   (b) neutrons only.
   (c) electrons only.   (d) protons and neutrons.

10. **Potassium, $K_{(s)}$, produces a flame that is:**
    (a) red.   (b) green-blue.
    (c) red-orange.   **(d) purple (violet).**

11. **A fluorine ion has:**
    (a) 9 protons, 10 neutrons and 9 electrons.
    (b) 9 protons, 11 neutrons and 10 electrons.
    (c) 9 protons, 10 neutrons and 10 electrons.
    (d) 10 protons, 20 neutrons and 9 electrons.

12. **An ionic bond is formed between:**
    (a) two metals.   **(b) a metal & non-metal.**
    (c) two non-metals   (d) none of these

13. **A substance dissolved in water has a state of**
    (a) gas   **(b) aqueous**
    (c) precipitate.   (d) sublimate.

14. **A solution which contains less than the maximum amount of solute is said to be:**
    (a) saturated.   (b) supersaturated.
   **(c) unsaturated.**   (d) concentrated.

15. To dissolve a solid more easily in a liquid, you should:
(a) cool the solution.   (b) heat the solution.
(c) stir the solution.   **(d) both (b) and (c).**

16. If you are making hot chocolate, the powder is the ___ and the milk is the ___.
(a) solution; solute.   **(b) solute; solvent.**
(c) solvent; solute.   (d) none of the above

17. The following is an example of a _____ reaction. $Zn_{(s)} + HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$
(a) decomposition
(b) synthesis
(c) single displacement
(d) double displacement

18. When sodium bicarbonate is heated sodium carbonate, water and carbon dioxide is made.
$$2NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + H_2O_{(l)} + CO_{2(g)}$$
This is an example of a _____ reaction.
(a) decomposition   (b) synthesis
(c) single displacement   (d) double disp.

19. The amount of atoms in one mole is
(a) 6.02×10^{23} atoms.   (c) 3.01×10^{23} atoms
(b) 1 molecule   (d) 1.0×10^1 molecules

20. The formula for aluminium bromide is:
(a) $AlBr$ (b) Al_3Br **(c) $AlBr_3$**   (d) AlB_3

21. The term given for the "*mass of one mole*" of a substance is:
(a) elemental mass.   (b) substance mass.
(c) given mass.   **(d) molar mass.**

22. Which symbol is used for the # of moles?
(a) m (b) M **(c) n**   (d) C

23. If 24 g of carbon react with 64 g of oxygen according to the following reaction, what mass of carbon dioxide is produced?
$$C_{(s)} + O_{2\,(g)} \rightarrow CO_{2\,(g)}$$
(a) 64 g   (b) 44 g   (c) 24 g   **(d) 88 g**

24. To calculate the volume of a solution you must:
(a) divide n by C.   (b) multiply n by C.
(c) divide m by n.   (d) multiply m by n.

25. What is the molar mass of CH_4?
(a) 4.04 g/mol   **(b) 16.05 g/mol**
(c) 18.02 g/mol   (d) 12.01 g/mol

26. To calculate the number of <u>atoms</u> in 2 moles of H_2O, you must...
(a) divide Avogadro's number by 2.
(b) multiply Avogadro's number by 6.
(c) multiply Avogadro's number by 2.
(d) multiply 6.023×10^{23} by 2.

27. The simplest ketone is:
(a) ethanone.   **(b) propanone.**
(c) methanone.   (d) butanone.

28. During an experiment, an SCH 4CI student actually obtains 7.47 g of a product. The theoretical yield is 7.76 g. What is the percent yield of this product?
(a) 0.963 %   (b) 0.00963 %
(c) 9.63 %   **(d) 96.3 %**

29. Alkynes contain:
(a) single C-C bonds only.
(b) double C=C bonds only.
(c) triple C≡C bonds only.
(d) single C-C and double C=C bonds.

30. All alkanes should end in:
(a) ene   (b) yne   **(c) ane**   (d) ane or ene

31. The general formula for an alkane is
(a) C_nH_{2n+2}   (b) C_nH_{2n}
(c) C_nH_{2n-2} (d) C_nH_{2n+1}

32. Which of the following side groups should be written first when naming an organic compound?
(a) methyl   (b) ethyl
(c) propyl   **(d) butyl**

33. The process where alcohols are reacted with carboxylic acids is called:
(a) cracking.   **(b) esterification.**
(c) reforming.   (d) addition.

34. During reduction:
(a) there is a gain of electrons.
(b) there is a loss of electrons.
(c) electrons may be gained or lost.
(d) None of the above are correct.

35. Which of the following will <u>speed up</u> the rate of corrosion?
(a) painting the metal
(b) cathodic protection
(c) galvanizing the metal
(d) adding salt to the metal's environment

36. Oxidation involves the gain of electrons.
(a) True   **(b) False**

37. When a base is dropped onto blue litmus paper,
(a) the colour of the litmus does not change.
(b) the blue colour changes to red.
(c) the blue colour intensifies.
(d) none of the above.

38. A solution with a pH of 6.8 is
(a) slightly acidic.   (b) strongly acidic.
(c) slightly basic.   (d) strongly basic.

39. A base has a pH less than 7.
(a) True   **(b) False**

40. An acid with a pH of 3 is 100 X more acidic than an acid with a pH of 5.
(a) True   (b) False

Part B: SHORT ANSWER [/40]

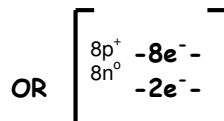Answer all of the questions in the space provided.

41. Draw a Bohr-Rutherford diagram for an oxygen ion, O^{-2} [/5]

✓ $8p^+$
✓ $8n^o$
✓ 2 energy levels
✓ 2, 8
✓ [ ]$^{-2}$

(8p$^+$ / 8n^o)

-2

OR $\begin{bmatrix} 8p^+ & -8e^- - \\ 8n^o & -2e^- - \end{bmatrix}$
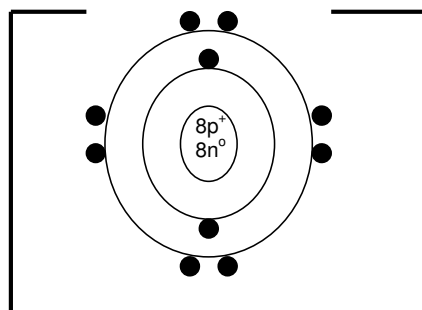
42. Complete the following chart. [/3]

Compound	ΔEN (0.5)	Lewis Diagram (0.5)	3-D Structural Formula (show partial charges if present)	Molecular Shape (name)
CO_2	O-3.44 C-2.55 / 0.89	$O = C = O$	$\overset{\delta-}{O} = \underset{\longleftarrow \; \delta+ \; \longrightarrow}{C} = \overset{\delta-}{O}$	LINEAR

43. Ammonia, $NH_{3(g)}$, is made during the Haber process by combining 5.00 g of nitrogen gass, $N_{2(g)}$, with hydrogen gas, $H_{2(g)}$. Calculate how much hydrogen is needed, in grams. [8]

✓ _____$N_{2(g)}$ + _3_$H_{2(g)}$ → _2_$NH_{3(g)}$
   m=5.00g   m=?
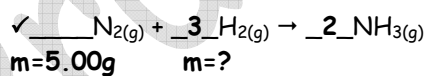
✓ $n = \dfrac{m}{M}$ ✓ $\dfrac{1 mol N_2}{0.179 mol} = \dfrac{3 mol H_2}{x}$ ✓m = nM

$n = \dfrac{5.00g}{28.0g/mol}$ ✓x = 0.537 mol H_2 m = (0.537mol)(2.02g/mol)

✓n = 0.179 mol N_2 ✓m = 1.08 g of H_2

✓Therefore 1.08 g of $H_{2(g)}$ is needed.

44. **IDENTIFY** the family (alkane, alkene, alkyne, aromatics, alcohol, ether, aldehyde, ketone, carboxylic acid, ester, amine, amide, polymer) and **NAME** the following molecules

Structural Diagram	Family	Name
a.	alkane	2-methylbutane
b.	aldehyde	ethanal
c.	ester	propylbutanoate
d.	alcohol	1-pentanol
e.	alkyne	1-octyne
f.	ketone	butanone
g.	carboxylic acid	propanoic acid
h.	ether	methoxy ethane

45. The concentration of sulphuric acid can be analyzed by titration with hydroxide solution. Three 10.0 mL samples of sulphuric acid are titrated with a standardized 0.200 mol/L solution of potassium hydroxide. The results for the three trials are shown in the table below. What is the concentration of sulphuric acid? [/8]

Trial	1	2	3	Average
Final burette reading	13.85 mL	26.95 mL	39.85 mL	
Initial burette reading	0.70 mL	13.90 mL	26.90 mL	
Volume of kOH added	13.15	13.05	12.95	13.05

✓_____ $H_2SO_{4(aq)}$ + __2__ $KOH_{(aq)}$ → _____ $K_2SO_{4(aq)}$ + _2_ $H_2O_{(l)}$

C = ?   C = 0.200M

V = 0.01305L   V = 0.010L

✓n_{KOH} = CV   ✓$\dfrac{2molKOH}{0.002mol} = \dfrac{1molH_2SO_4}{x}$ ✓$C_{H_2SO_4} = \dfrac{n}{V}$

= (0.200)(0.010)   ✓x = 0.001 mol $= \dfrac{0.001}{0.01305}$
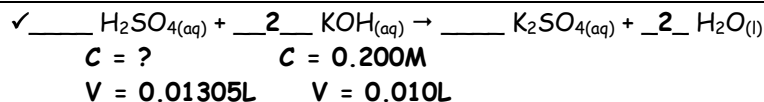
✓= 0.002 mol KOH   ✓= 0.077M

✓Therefore, the concentration of H_2SO_4 is 0.077M