GRADE 11 CHEMISTRY

FINAL — PRACTICE REVIEW TEST

Name

Student Number

Attending ☐   **Non-Attending** ☐

Phone Number

Address

VALUE: TOTAL 100 MARKS

PART A

Circle the correct answer to the following questions. **THERE IS ONLY ONE CORRECT RESPONSE TO EACH QUESTION.** You may use a periodic table to assist in answering all questions on the exam. (50 x 1 = 50 marks)

1.   The number of protons in F^- is
   a)   3
   b)   5
   c)   7
   d)   9

2.   A **FALSE** statement about noble gases is that they
   a)   are the key to discovering families of elements and their arrangement in the periodic table
   b)   are unreactive with the alkali metals under ordinary conditions
   c)   cannot form compounds under any conditions
   d)   exist as monatomic gases under ordinary conditions

3.   An element in group IIA would
   a)   be shiny and stored under water
   b)   be a gas at room temperature and not react with other elements
   c)   be a member of the alkali family
   d)   form a white solid when exposed to chlorine

4.   The correct name for the compound Fe_2S_3 is
   a)   iron sulfide
   b)   iron (III) sulfide
   c)   iron (II) sulfide
   d)   ferrous sulfide

5.   Nickel and oxygen combine to form two different ionic compounds. The formula for the most common of these is
    a) NiO
    b) Ni_2O_3
    c) Ni_2O_2
    d) NiO_2

6.   For covalent bonding between atoms, it is assumed that one or more valence electron(s) is/are
    a)   shared
    b)   transferred
    c)   equally shared and transferred
    d)   neither shared nor transferred

7.   In forming a chemical compound containing magnesium and oxygen the magnesium atoms transfer 2 electrons to the oxygen atoms. The formulas of the ions involved would be
    a) Mg^{2+} and O^-
    b) Mg^{2+} and O^{2-}
    c) Mg^+ and O^{2-}
    d) Mg^{2+} and O^-_2

8.   The correct formula and corresponding name of a possible IONIC compound is
    a) K_2O- potassium oxide
    b) NH_3 nitrogen trihydride
    c) OF_2- oxygen difluoride
    d) NO_2 nitrogen dioxide

9.   Vinegar contains
    a) $HCl_{(aq)}$
    b) $CH_3OH_{(aq)}$
    c) $CH_3COOH_{(aq)}$
    d) $CH_3COOCH_{3(aq)}$

10.   The correct formula for grain alcohol (ethanol) is
    a) CH_3OH
    b) $(CH_3)_2OH$
    c) CH_5OH
    d) C_2H_5OH

11.   _____ $Ca(OH)_2$ + _____ $NH_4Cl \rightarrow$ _____ NH_4OH + _____ $CaCl_2$
    The coefficients for the above balanced equation are respectively
    a)   1,2,2,1
    b)   2,3,3,1
    c)   2,3,2,2
    d)   2,3,3,2

12.   If 8.88g of cesium iodide dissolves to form 100mL of saturated solution, the molar solubility of cesium iodide is
    a)   0.169 mol/L
    b)   0.342 mol/L
    c)   1.68 mol/L
    d)   2.60 mol/L

13.   The factor which does not affect the solubility of gases in water is
       a)   the pressure of the gas
       b)   the temperature of the water
       c)   the polarity of the gas molecules
       d)   the stirring rate

14.   The factor that will have no effect on solubility is the
       a)   nature of the solute and solvent
       b)   temperature of the solvent
       c)   pressure on a gas
       d)   amount of stirring of a solution

15.   The complete combustion of a hydrocarbon yields
       a)   carbon and hydrogen
       b)   carbon monoxide and water vapor
       c)   carbon and water vapor
       d)   carbon dioxide and water vapor

16.   _____ $Fe(NO_3)_{2(aq)}$ + _____ $Na_2S_{(aq)}$ → _____ $NaNO_{3(aq)}$ + _____ $FeS_{(s)}$
       Balance the above equation using simplest whole numbers. If 4 mol of reactants are used, then the TOTAL quantity of matter produced is
       a)   6 mol
       b)   7 mol
       c)   8 mol
       d)   10 mol

17.   The concentration of a solution made by dissolving 23.4 g of sodium chloride in 500 mL of solution is
       a)   0.100 mol/L
       b)   0.200 mol/L
       c)   0.400 mol/L
       d)   0.800 mol/L

18.   The least concentrated solution chosen from the following is
       a)   200 mL of 0.500 mol/L $CH_3COOH_{(aq)}$
       b)   150 mL of 1.00 mol/L $NaCl_{(aq)}$
       c)   100 mL of 0.100 mol/L $CH_3OH_{(aq)}$
       d)   150 mL of 0.050 mol/L $HNO_{3(aq)}$

19.   The molar mass of potassium sulfate is
       a)   183.1 g/mol
       b)   174.3 g/mol
       c)   149.3 g/mol
       d)   135.2 g/mol

20.   The mass of 0.0202 mol of magnesium hydroxide is
       a)   0.0202 g
       b)   0.834 g
       c)   1.18 g
       d)   58.3 g

21. $2Na_{(s)} + Cl_{2(g)} \rightarrow 2NaCl_{(s)}$
        In the equation above, the quantity of chlorine gas that reacts with 4 mol of sodium would be
        a)   0.5 mol
        b)   1 mol
        c)   2 mol
        d)   4 mol

22.   293 K is equivalent to:
        a)   293°C
        b)   20°C
        c)   -273°C
        d)   101.3°C

23.   0°C is equivalent to:
        a)   273 K
        b)   0 K
        c)   −273 K
        d)   101.3 K

24.   The notation not characterizing a solution is
        a) $HCl_{(aq)}$
        b) $Br_{2(alcohol)}$
        c) $C_{12}H_{22}O_{11(aq)}$
        d) $Br_{2(l)}$

25.   When an H atom and a Cl atom react, a chemical bond can be expected to form because each atom tends to
        a)   acquire a stable octet
        b)   acquire a valence population of two electrons each
        c)   form an ion to obtain an octet of electrons
        d)   gain electrons to become like the nearest noble gas

26.   The following question refers to the imaginary Elements X and Y. Both are found in the upper part of Group IVA of
        the periodic table. The kind of bonding expected when X and Y combine is
        a)   ionic
        b)   nonpolar covalent
        c)   network covalent
        d)   both A and B

27.   The number of lone pairs of electrons around a chemically bonded carbon atom is
        a)   0
        b)   2
        c)   4
        d)   2 or 4

28.   Which of the following is a statement of Boyle's Law?
        a)   VT = constant
        b)   P/constant = V
        c)   PV = constant
        d)   V/constant = T

29. What will be the new volume of a fixed mass of gas whose pressure is increased from 50 kPa to 250 kPa at constant temperature?
    a) four times the original volume
    b) five times the original volume
    c) one fourth the original volume
    d) one fifth the original volume

30. Which of the following is a statement of Charles' Law?
    a) PV = constant
    b) V/T = constant
    c) PT = constant
    d) VT = constant

31. Which of the following are STP conditions?
    a) 273 K, 101.3 kPa
    b) 0 K, 101.3 kPa
    c) 0°C, 273 kPa
    d) 23°C, 103 kPa

32. Hydrogen bonding occurs when
    a) a high electronegativity atom and hydrogen is present
    b) a metallic atom and hydrogen atom is present
    c) hydrogen atoms are sharing electrons with either sulfur or nitrogen
    d) fluorine atom is joined with chlorine, nitrogen or oxygen

33. Which of the following is an organic substance?
    a) H_2CO_3
    b) $Ba(C_{17}H_{35}COO)_2$
    c) HOCN
    d) CH_3Br

34. Of the compounds, the one that would have the lowest boiling point would be
    a) C_9H_{20}
    b) C_4H_{10}
    c) CH_3CH_2COOH
    d) C_2H_5OH

35. The reaction of propanol with butanoic acid is an example of the process known as
    a) esterification
    b) combustion
    c) addition
    d) substitution

36. Aliphatic hydrocarbons have very similar physical properties. Identify the FALSE statements.
    a) The boiling point increases as the number of carbon atoms per molecule increases.
    b) Aliphatic hydrocarbons are nonpolar molecules.
    c) Aliphatic hydrocarbons can be obtained from crude oil by fractional distillation.
    d) Aliphatic hydrocarbons are soluble in solvents such as water, hydrochloric acid and sodium hydroxide solution.

37. The compound that is the most soluble in water is
  a) ethanol
  b) 1-pentanol
  c) 1-hexanol
  d) 3-octanol

38. An alkene is represented by the molecular formula
  a) C_3H_8
  b) C_4H_6
  c) C_9H_{18}
  d) C_6H_6

39. Which of the following compounds is a saturated aliphatic?
  a) $C_6H_5CH_3$
  b) C_7H_{16}
  c) C_9H_{18}
  d) C_5H_8

40. $CH_3CH_2CH_2OH$
  a) organic acid
  b) ester
  c) alcohol
  d) none of the above

41. Another name for rubbing alcohol (CH_3-CH_2-CH_2-OH) is
  a) 1-propanol
  b) ethanol
  c) methanol
  d) 2-propanol

42. Which of the following is an INCORRECT name for CH_3COOH?
  a) ethanedioic acid
  b) ethanoic acid
  c) acetic acid
  d) vinegar

43. The mass of 4.0 mol of $C_{10}H_{18}$ is
  a) 112 g
  b) 136 g
  c) 304 g
  d) 552 g

44. $16SO_2$ represents sixteen moles of sulfur dioxide, the mass represented would be
  a) 1024 g
  b) 704 g
  c) 640 g
  d) 64 g

Use the following information to answer questions 45 and 46.
7.17 g S_8 are reacted according to the following unbalanced equation _____S_8 + _____$O_2 \rightarrow$ _____ SO_2

45. When the equation is balanced, the coefficients are
 a) 0, 8, 8
 b) 1, 1, 8
 c) 0, 8, 0
 d) 1, 8, 8

46. The mass of SO_2
 a) 0.641 g
 b) 14.3 g
 c) 0.0280 g
 d) 17.91 g

Use this data to answer questions 47 to 49.
Solution I: 20ml of 6.0 mol/L HCl
Solution II: 30ml of 4.0 mol/L HCl
Solution III: 50ml of 3.0 mol/L HCl
Solution IV: 100ml of 1.0 mol/L HCl

47. The solution of HCl that would react with the greatest mass of zinc is
 a) I
 b) II
 c) III
 d) IV

48. The solution of HCl that would react most rapidly with zinc strip is most likely
 a) I
 b) II
 c) III
 d) IV

49. The solutions that contain equal amounts of dissolved hydrogen chloride are
 a) I and III
 b) I and II
 c) II and IV
 d) III and IV

50. The net ionic equation for the reaction between a sodium sulfide solution and a ferrous nitrate solution is
 a) $Na_2S_{(aq)} + Fe(NO_3)_{2(aq)} \rightarrow FeS_{(s)} + 2NaNO_{3(aq)}$
 b) $2Na^+_{(aq)} + S^{2-}_{(aq)} + Fe^{2+}_{(aq)} + 2NO_3^-{}_{(aq)} \rightarrow Fe^{2+}_{(aq)} + S^{2-}_{(aq)} + 2Na^+_{(aq)} + 2NO_3^-{}_{(aq)}$
 c) $Fe^{2+}_{(aq)} + S^{2-}_{(aq)} \rightarrow FeS_{(s)}$
 d) $Fe^{2+}_{(aq)} + S^{2-}_{(aq)} \rightarrow FeSO_{4(s)}$

PART B   (6 x 2 = 12 marks)

1.   A sample of a gas whose volume at 27°C is 100 mL is heated at constant pressure until its volume becomes 317 mL. What is the final Celsius temperature of the gas?

2.   A gas has a volume of 225 mL at 95°C and 275 kPa. What will be its volume at a temperature of 25°C and a pressure of 125 kPa?

3.   Write the dissociation equation showing the dissolving of magnesium phosphate in water.

4.   Solutions of strontium chloride and sodium sulfate are mixed. Write the net ionic equation for this reaction.

5.   Draw the Bohr diagram for **magnesium-25.** Also draw the Bohr diagram for the magnesium ion. (ie: show how many electrons are in each orbital)

6.   **Classify** each of the following reactions as: **synthesis, decomposition, single replacement, double replacement, acid-base neutralization or combustion**
        a) $2\ KClO_3 \rightarrow 2\ KCl + 3\ O_2$ _____
        b) $2\ Al + 3\ NiBr_2 \rightarrow 2\ AlBr_3 + 3\ Ni$ _____
        c) $AgNO_3 + KCl \rightarrow AgCl + KNO_3$ _____
        d) $2C_2H_6 + 7\ O_2 \rightarrow 4\ CO_2 + 6H_2O$ _____

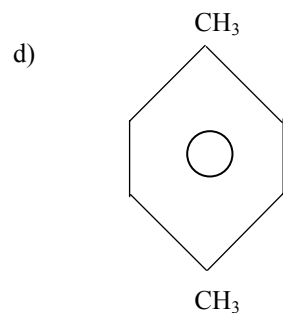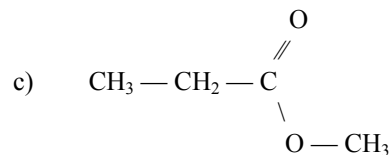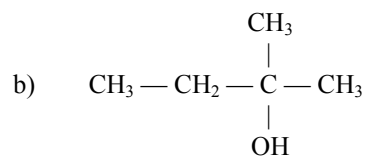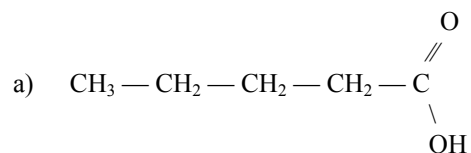**PART C**   Show all your work for calculations. (38 marks)

1.   Refer to the solubility chart as needed for the following. State whether each of the following is soluble (S) or has low solubility (LS). (3 marks)
        a) NH_4NO_3
        b) $Sr(OH)_2$
        c) Na_3PO_4

2.   A solution made by mixing 4.0 L of 2.0 M $MgCl_2$ with 6.0 L of 3.0M $AlCl_3$. There is no reaction. What is the concentration of the chloride ion after mixing? (3 marks)

3.   45.0 mL of 0.200 M lead (II) nitrate are reacted with 3.81 g of sodium chloride. Calculate the mass of lead (II) chloride that is formed. (5 marks)

4.   Draw the structural formula for each. (3 marks)

        a)   2, 3 — dimethylpentane
        b)   2, 3 — dimethylbutane
        c)   2 — butanol

5.   Name the following: (4 marks)

a) $CH_3 — CH_2 — CH_2 — CH_2 — C \overset{O}{\underset{OH}{\big\Vert}}$

b) $CH_3 — CH_2 — \overset{CH_3}{\underset{OH}{\overset{|}{C}}} — CH_3$

c) $CH_3 — CH_2 — C \overset{O}{\underset{O — CH_3}{\big\Vert}}$

d)

6.   A container holds 4.3 moles of SO_2 gas at standard temperature & pressure. Calculate (8 marks)
     a)   the volume of the container
     b)   the mass of the SO_2
     c)   the number of molecules of SO_2
     d)   the number of atoms of oxygen

7.   Calculate the mass of NaOH contained within a 10.0 mL sample of 0.00250 M NaOH solution (3 marks)

8.   Calculate the volume of 1.20 M H_2SO_4 that will contain 0.300 mol of solute. (3 marks)

9.   Write structural formulas for all substances and balance the following equations. Identify the type of reaction. (6 marks)

a)   Butane & Bromine $\rightarrow$

b)   Propene & Oxygen $\rightarrow$