

Name of student:-

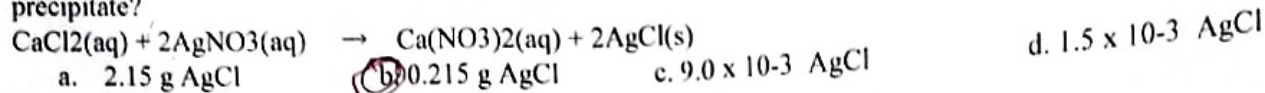
Answer the following questions:-

Q1) Circle the most correct answer:- ( $R = 0.082 \text{ L atm.mol}^{-1}\text{K}^{-1}$ )

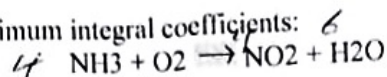
1. Which of the following units is useful in relating concentration of solution with its vapor pressure?  
☒ (i) mole fraction      (ii) parts per million      (iii) mass percentage      (iv) molality
2. A beaker contains a solution of substance 'A'. Precipitation of substance 'A' takes place when small amount of 'A' is added to the solution. The solution is \_\_\_\_\_.  
 (i) saturated      ☒ (ii) supersaturated      (iii) unsaturated      (iv) concentrated
3. The values of Van't Hoff factors for KCl, NaCl and  $\text{K}_2\text{SO}_4$ , respectively, are \_\_\_\_\_.  
 (i) 2, 2 and 2      ☒ (ii) 2, 2 and 3      (iii) 1, 1 and 2      (iv) 1, 1 and 1
4. Determine the elevation of the boiling point of a aqueous solution with 1 mol of solute (glucose). (density =  $1.2 \text{ g/mL}$ )  
 (Assume the volume 1000 ml, molar mass of glucose is 180g)  
 $\Delta T_b = K_b \cdot m$  wt solute =  $1 \times 180 = 180 \text{ g}$   
 $= K_b \cdot \frac{180}{1000 \times 1.2}$   
 $= 0.98 K_b$   
 $= 1200$   
 $= 1200 - 180$   
 $= 1020$   
 a.  $K_b$       b.  $0.2 K_b$       c.  $0.02 K_b$       ☒ d.  $0.98 K_b$
5. Which of the following aqueous solutions should have the highest boiling point?  
 (i)  $1.0 \text{ M NaOH}$       ☒ (ii)  $1.0 \text{ M Na}_2\text{SO}_4$       (iii)  $1.0 \text{ M NH}_4\text{NO}_3$       (iv)  $1.0 \text{ M KNO}_3$
6. In comparison to a  $0.01 \text{ M}$  solution of glucose, the depression in freezing point of a  $0.01 \text{ M MgCl}_2$  solution is.  
 (i) the same      (ii) about twice      ☒ (iii) about three times      (iv) about six times.
7.  $4 \text{ L}$  of  $0.02 \text{ M}$  aqueous solution of  $\text{NaCl}$  was diluted by adding one litre of water. The molality of the resultant solution is.  
 i)  $0.004$       ii)  $0.008$       iii)  $0.012$       ☒ iv)  $0.016$
8. Consider the following unbalanced redox equation:  
 $\underline{\hspace{1cm}} \text{CH}_3\text{OH}(\text{l}) + \underline{\hspace{1cm}} \text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \underline{\hspace{1cm}} \text{H}^+(\text{aq}) \rightarrow \underline{\hspace{1cm}} \text{CH}_2\text{O}(\text{aq}) + \underline{\hspace{1cm}} \text{Cr}^{3+}(\text{aq}) + \underline{\hspace{1cm}} \text{H}_2\text{O}(\text{l})$   
 Which of the following sets of numbers will balance the equation?  
 A. 1, 1, 14, 1, 2, 7      ☒ B. 3, 1, 8, 3, 2, 7      C. 3, 1, 8, 3, 2, 8      D. 3, 1, 14, 3, 2, 8
9. Calculate the osmotic pressure associated with  $50.0 \text{ g}$  of an enzyme of molecular weight  $98,000 \text{ g/mol}$  dissolved in water to give  $2600 \text{ mL}$  of solution at  $30.0^\circ \text{C}$ . ( $1 \text{ atm} = 760 \text{ torr}$ )  
 (a)  $0.484 \text{ torr}$       (b)  $1.68 \text{ torr}$       (c)  $1.96 \text{ torr}$       (d)  $2.48 \text{ torr}$       ☒ (e)  $3.71 \text{ torr}$
10. Which of the following statements does not support Arrhenius' work with acids and bases?  
 a. Arrhenius discovered that all acidic and basic solutions he tested were electrolytes.  
 b. He determined that acids and bases must ionize or dissociate in water.  
 c. According to Arrhenius, an acid is defined as a hydrogen-containing compound that ionizes to yield hydrogen ions ( $\text{H}^+$ ) dissolved in aqueous solution.  
☒ d. According to Arrhenius, an acid is defined as a compound that ionizes to yield hydroxide ions ( $\text{OH}^-$ ) in aqueous solution.

11. Which of the following is considered a limitation of the Brønsted—Lowry definition of acids and bases?
- The Brønsted—Lowry theory expands the definition of an acid and base to a proton donor or acceptor.
  - Even though acids and bases can occur without water, there is still a requirement for the presence of a solvent.
  - The Brønsted—Lowry theory cannot explain why some substances without hydroxides, like ammonia, can act as bases.
  - ☒ The Brønsted—Lowry theory does not explain how substances without protons can act as acids.

12. If 30.0 mL of 0.150 M  $\text{CaCl}_2$  is added to 15.0 mL of 0.100 M  $\text{AgNO}_3$ , what is the mass in grams of  $\text{AgCl}$  precipitate?



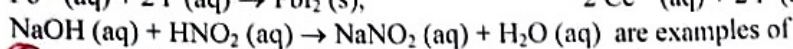
13. Balance the following equation using minimum integral coefficients:



The stoichiometric coefficient for oxygen gas  $\text{O}_2$  is:

- a. 1      b. 4      c. 3      ☒ d. 7      e. 5

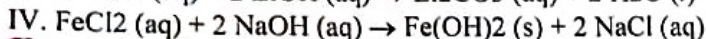
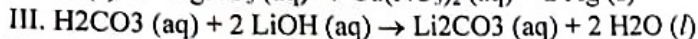
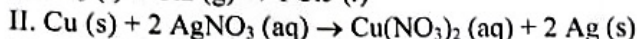
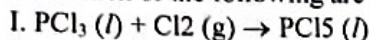
14. The following reactions:



are examples of

- ☒ a) precipitation, redox, and acid-base reactions, respectively.      b) unbalanced reaction  
 c) precipitation, acid-base, and redox reactions, respectively.      d) acid-base reactions.  
 e) redox, acid-base, and precipitation reactions, respectively.

15. Which of the following are oxidation-reduction reactions?



- ☒ a) I and II      b) IV      c) III      d) I, II, and III      e) I, II, III, and IV

16. In the Brønsted—Lowry definition, an acid is a substance that

- ☒ a) donates protons.      c. neutralizes hydronium ions.      b. accepts protons.      d. forms a salt.

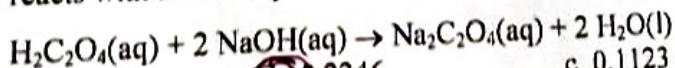
17. What is the best definition of the term "theory," as it is used in science?

- a. A theory is a guess or hunch تخمين about something that has occurred in nature.  
☒ b. A theory is a comprehensive set مجموعة شاملة of ideas افكار explaining a phenomenon in nature.  
 c. A theory is based on verifiable laws and can be proven true.  
 d. A theory is a hypothesis that uses laws and observation to make an assumption.

18. How many significant figures should be given in the result of  $\frac{534.71 \times 321.83 \times 0.00186}{7.529 \times 10^{-3}}$ ?

- ☒ a. 3      b. 5      c. 4      d. 2      e. 6

19. 25.00 mL of a solution of oxalic acid,  $\text{H}_2\text{C}_2\text{O}_4$ , are titrated with 0.2586 M  $\text{NaOH}(\text{aq})$ . The stoichiometric end point is reached when 43.42 mL of the solution of base is added. What is the molarity of the oxalic acid solution? Oxalic acid reacts with sodium hydroxide as shown below:



- a. 0.0112      ☒ b. 0.2246      c. 0.1123      d. 0.4491

20. What is the net ionic equation for the acid-base reaction that occurs when acetic acid and potassium hydroxide solutions are mixed?

