



**Circle the Correct Answer (1.25 point each question)**

الرجاء نقل رمز الإجابة الصحيحة على الجدول في الصفحة الأولى

(gas constant = 0.08216 atm.L /mol. K)

1- The number of significant figures in 0.020415 is:

- a- 2                                      b- 4                                      c- 5                                      d- 3

2.  $\text{H}_3\text{PO}_4$  is:

- a- polyatomic molecules                                      b- ionic compound  
c- polyatomic ions    d- diatomic molecule

3- 27.22g of X (molar mass = 31 g/mol) react with 20 g of Y to form  $\text{X}_2\text{Y}$  compound. Calculate the molar mass of Y?

- a- 30.65                                      b- 45.56                                      c- 20.56                                      d- 40.65

4- Which chemical substance is the oxidizing agent in this reaction?



- a- Sr                                      b-  $\text{Sr}^{+2}$                                       c-  $\text{O}_2$                                       d-  $\text{O}^{-2}$

5 - A 0.6745 g acid sample KHP ( $\text{KHC}_8\text{H}_4\text{O}_4$ ) (Molecular weight of KHP = 204 g/mol).

Reacts with 41.75 mL of KOH solution for complete neutralization. What is the molarity of the KOH solution?

- a- 0.158 M                                      b- 0.099 M                                      c- 0.139 M                                      d- 0.079 M

6- What is the concentration of  $\text{Na}^+$  in 0.65 M ,200mL of  $\text{Na}_2\text{SO}_4$ ?

- a- 1.3 M                                      b- 1.95 M                                      c- 0.65 M                                      d- 0.325 M

7- For the following reaction identify the conjugate acid/base pair



- a -  $\text{CH}_3\text{COOH} / \text{H}_2\text{O}$                                       c-  $\text{H}_2\text{O} / \text{H}_3\text{O}^+$   
b-  $\text{CH}_3\text{COOH} / \text{CH}_3\text{COO}^-$                                       d-  $\text{CH}_3\text{COO}^- / \text{H}_3\text{O}^+$

8- 5.12 g of an ionic compound containing Iodide ion  $I^-$  dissolved in water and treated with  $AgNO_3$  to form 6.37 g  $AgI$  precipitate, what is the percent by mass of  $I^-$  in the original sample?

- a- 76.3%                      b- 37.9%                      c- 67.3%                      d- 73.8%

9- If  $K_w$  is  $1 \times 10^{-14}$  at  $25^\circ C$ , what is the  $[H^+]$  at  $25^\circ C$ , if the  $[OH^-] = 2.3 \times 10^{-5} M$ ?

- a-  $1.42 \times 10^{-8} M$                       b-  $7 \times 10^{-7} M$                       c-  $4.35 \times 10^{-10} M$                       d-  $1 \times 10^{-14} M$

10- Calculate the pH of a solution if it's  $[OH^-] = 0.000700 M$  and indicate whether the solution is acidic, basic, or neutral.

- a- 3.15, acidic                      b- 17.2, basic                      c- 10.8, basic                      d- 11.8, basic

11- If  $K_a$  of  $HCN = 6.2 \times 10^{-10}$ , what is the  $K_b$  of its conjugate base  $CN^-$ ?

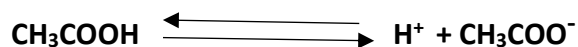
- a-  $1.6 \times 10^{-5}$                       b-  $6.2 \times 10^{-10}$                       c-  $1.6 \times 10^{-14}$                       d-  $6.2 \times 10^{+4}$

12- Which acid is the strongest acid?

$K_a$ of $HCN = 6.2 \times 10^{-10}$	$K_a$ of $CH_3COOH = 1.8 \times 10^{-5}$
$K_a$ of $HF = 6.3 \times 10^{-4}$	$K_a$ of $HNO_2 = 4.0 \times 10^{-4}$

- a –  $HCN$                       b-  $HF$                       c-  $HNO_2$                       d-  $CH_3COOH$

13- What is the pH of a solution containing 6.00 g of  $CH_3COOH$  (60 g/mol) in 1.00 L of solution, given that the  $K_a$  of  $CH_3COOH$  is  $1.8 \times 10^{-5}$



- a- 5.74                      b- 4.74                      c- 1.87                      d- 2.87

14- A solution which is formed by combining 300 mL of 0.020 molar NaOH with 700 mL of 0.010 molar HCl has a pH of:

- a- 2                                  b- 3                                  c- 4                                  d- 5

15- A 0.010 M solution of a weak monoprotic acid is 5.0% dissociated. What is the equilibrium constant  $K_a$  for this acid?

- a-  $5.0 \times 10^{-2}$                       b-  $5.0 \times 10^{-3}$                       c-  $2.5 \times 10^{-4}$                       d-  $2.5 \times 10^{-5}$

16- The instrument used to measure the atmospheric pressure is called

- a- Seismometer                  b- Hydrometer                  c- PH meter                  d- Barometer

17- What is the density of Xe gas at a pressure of 2.40 atm and a temperature of 10°C?

- a- 82.3g/L                  b- 8.65 g/L                  c- 13.6 g/L                  d- 0.64 g/L

18- What is the volume in L occupied by 5.58 g of  $\text{NH}_3$  at STP?

- a- 125 L                  b- 22.4 L                  c- 8.0 L                  d- 7.4 L

19- A mixture consisting of 0.140 mol  $\text{N}_2$ , 0.037 mol  $\text{O}_2$ , 0.104 mol  $\text{CH}_4$ , and an unknown amount of  $\text{CO}_2$  occupies a volume of 8.48 L at 27°C and 1.06 atm pressure. How many moles of  $\text{CO}_2$  are there in this sample?

- a- 0.719 mol  
b- 0.0839 mol  
c- 2.45 mol  
d- 3.77 mol

20- An unknown gaseous hydrocarbon consists of 85.63% carbon by mass. A 0.959-g sample of the gas occupies a volume of 0.51 L at STP. What is the identity of the gas?

- a-  $C_3H_6$
- b-  $C_4H_8$
- c-  $CH_2$
- d-  $C_2H_4$

21- What is the electron configuration of Mg in  $MgCl_2$  compound?

- a-  $1s^2 2s^2 2p^6 3s^2$
- b-  $1s^2 2s^2 2p^6$
- c-  $1s^2 2s^2 2p^5$
- d-  $1s^2 2s^2 2p^6 3s^2 3p^2$

22- The electron configuration of Magnesium (Mg) has .....unpaired electrons and its

- a - 1, paramagnetic
- b- 0, Diamagnetic
- c- 2, Diamagnetic
- d- 2, paramagnetic

23- Which one of the following sets of quantum numbers is not correct?

- a-  $n=4, l=3, m_l=-3, m_s=+1/2$
- b-  $n=4, l=2, m_l=+2, m_s=-1/2$
- c-  $n=4, l=4, m_l=+2, m_s=+1/2$
- d-  $n=4, l=1, m_l=0, m_s=+1/2$

24-What is the maximum number of electrons in the d-orbital?

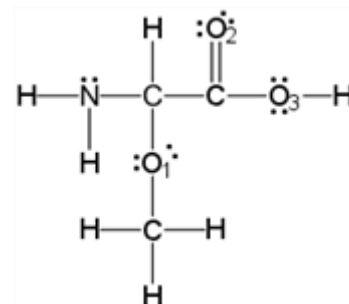
- a - 10
- b- 6
- c-14
- d- 2

25. Which of the following is isoelectronic with  $Ca^{+2}$ ?

- a-  $S^{2-}$
- b- Ca
- c-  $Al^{3+}$
- d- K

26- What is the molecular geometry and hybridization on oxygen atom  $O_1$ ?

- a- Bent,  $sp^3$
- b- Linear,  $sp^3$
- c- Bent,  $sp$
- d- Linear,  $sp$



27. Which one of the following orbitals is incorrect?

a-1S

b- 2P

c-2F

d- 4d

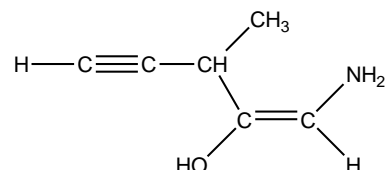
28- What is the number of  $\pi$  bond, and lone pair (nonbonding) in this structure?

a- 4  $\pi$ , 2 pair

b- 2  $\pi$ , 3 pair

c- 3  $\pi$ , 3 pair

d- 5  $\pi$ , 3 pair



29- Which of the following characteristics does not apply to  $\text{PF}_3$ ?

a- has three  $\sigma$  bonds

b- contains polar bonds

c- trigonal planar

d- one lone pair of electrons on phosphorus

30. The electronic configuration of Vanadium is:

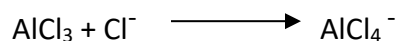
a-  $[\text{Ne}]4s^2$

b-  $[\text{Ar}]4s^2$

c-  $[\text{Ar}]4s^23d^4$

d-  $[\text{Ar}]4s^23d^3$

31- Describe the change in hybridization (if any) of the Al atom in this reaction:



a-  $p \rightarrow sp^2$

b-  $sp \rightarrow sp^2$

c-  $sp^2 \rightarrow sp^3$

d-  $sp \rightarrow sp^3$

32- Which one of the following molecules should be linear?

a-  $\text{CCl}_4$

b-  $\text{H}_2\text{O}$

c-  $\text{NH}_3$

d-  $\text{BeCl}_2$

Good Luck