

**Future Generation Hope secondary & preparatory school Ambo Branch**

**Teacher's Name:-Almaz & Abdisa Subject:- Chemistry Exam Type:- Model exam**

**Grade:- 12 Semester:- 2<sup>nd</sup> Academic year:- 2020G.C Time allowed: 1:30'**

**Name:..... Section..... No. ....**

**I. CHOOSE THE CORRECT ANSWER FROM THE GIVEN ALTERNATIVES.**

1. How many significant figures are there in 0.01050? A. One B. Four C. Two D. Three.
2. A conversion factor, like the definition  $1000\text{m} = 1\text{Km}$  is;  
A. Approximate B. Exact C. Cannot be predicted D. Subject to individual opinion
3. The relationship between nano meter(nm) & picometer(pm) is:  
A.  $1\text{nm} = 1000\text{pm}$  B.  $1\text{nm} = 100\text{pm}$  C.  $1\text{Pm} = 10\text{nm}$  D.  $1\text{nm} = 10\text{pm}$
4. What is the sum of  $6.42 \times 10^6$  &  $8.24 \times 10^5$  to the correct significant figure?  
A.  $7.244 \times 10^6$  B.  $7.24 \times 10^6$  C.  $14.66 \times 10^6$  D.  $1.466 \times 10^5$
5.  $-70^\circ\text{C}$  is equal to A.  $203.15\text{K}$  B.  $-94^\circ\text{F}$  C.  $-114^\circ\text{F}$  D. A & B E. None.
6. Which of the following is not true about Dalton's Atomic theory? A. Atoms are indivisible.  
B. Atoms of different element are different.  
C. Atoms of the same element have different mass.  
D. Atoms combine in small whole number ratio to form compounds.
7. Of the following types of rays combine to form atoms of helium?  
A. Gamma rays B. Beta rays C. Alpha rays D. X- rays
8. What is the difference between chlorine-35 & chlorine-37?  
A. chlorine-37 has two more protons than chlorine-35.  
B. chlorine-37 has two more neutrons than chlorine-35.  
C. chlorine-37 has two more electrons than chlorine-35  
D. chlorine-37 has two more protons & one more neutron than chlorine-35

9. The atomic mass of the two stable isotopes of boron  $^{10}_5\text{B}$  (0.1978) &  $^{11}_5\text{B}$  (0.8022) are 10.0129amu & 11.0093amu respectively. Which one is the relative atomic mass of boron?
- A. 10.81amu      B. 25amu      C. 15amu      D. 5.80amu
10. One of the following is extensive physical property? A. Color B. Density C. Mass D. Melting point
11. Chemical compounds are formed when atoms combine in whole number ratio is:
- A. Law of conservation of mass      B. Law of definite proportion
- C. Law of multiple proportion      D. Law of in destructive matter
12. One of the following is not the cause of uncertainty?
- A. Carelessness of the person B. Poor calibration of the instrument C. The price of the instrument. D. Variability in the item being measured
13. Round off 45.68m to one decimal place: A. 45.7 B. 45.6 C. 45.5 D. 45.0
14. Deflection of beta particles to wards: A. negative plate B. positive plate C.un deflected D. unknown
15. The closeness of the measured value to each other is:
- A. Accuracy B. Precision C. Significant figure D. Random error
16. The exactness of the measured value to the true value is:
- A. Accuracy B. Precision C. Exact number D. Inexact number
17. One of the following is not a correct laboratory safety rule?
- A. Add water to acids but not acid to water      B. Protect your eyes
- C. Don't suck the solution in the pipette by mouth      D. None
18. Which one of the following electromagnetic radiations has the shortest wave length?
- A. X- rays      B. Uv- rays      C. gamma rays      D. micro waves
19. Which one of the following electron transitions requires the smallest energy to be absorbed by hydrogen atom? A. From n=1 to n=2      C. From n=3 to n=4
- B. From n=2 to n=3      D. From n=4 to n=5

20. Which theory of bonding explains that oxygen is paramagnetic?  
 A. VSEPR Theory B. Molecular Orbital Theory C. Valance Bond Theory D. Lewis Theory
21. Which one of the following molecule possesses dipole moment greater than zero?  
 A.  $\text{CCl}_4$  B.  $\text{CS}_2$  C.  $\text{CH}_4$  D.  $\text{CHCl}_3$
22. Numbers of possible resonance structure of Nitrate ion ( $\text{NO}_3^-$ ) are? A. 1 B. 2 C. 3 D. 4
23. The types of bond formed between sodium and bromine is A. Covalent bond B. Ionic bond  
 C. Metallic bond D. Coordinate bond
24. Which one of the following molecule is  $\text{AX}_4\text{E}$  type? A.  $\text{H}_2\text{S}$  B.  $\text{CH}_4$  C.  $\text{SF}_4$  D.  $\text{SF}_6$
25. How many sigma bond and pi bond are there in 1,3- butene? ( $\text{H}_2\text{-C=CH-CH=C-H}_2$ )  
 A. 9 and 2 B. 2 and 9 C. 4 and 5 D. 5 and 4
26. The hybridization of carbon in  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{C}_2\text{H}_4$  respectively is  
 A.  $\text{SP}$ ,  $\text{SP}^3$ ,  $\text{SP}^2$  B.  $\text{SP}^2$ ,  $\text{SP}$ ,  $\text{SP}^3$  C.  $\text{SP}^3$ ,  $\text{SP}$ ,  $\text{SP}^2$  D.  $\text{SP}^3$ ,  $\text{SP}^3$ ,  $\text{SP}^2$
27. Which one of the following is not affected by intermolecular force ?  
 A. Melting point B. Boiling point C. Phase change D. All
28. Which one of the following increases when the concentration of reactant molecular  
 Increases? A. The frequency of molecular collision C. The rate constant  
 B. The average kinetic energy D. The activation energy
29. Raising the temperature of reaction doesn't increase? A. Rate of reaction B. Number of  
 collision C. Average molecular velocity D. Activation energy
30. Which one of the following is concentration time equation of first order of reaction?  
 A.  $[\text{A}]_t = -Kt + [\text{A}]_0$  B.  $\ln \frac{[\text{A}]_0}{[\text{A}]_t} = Kt$  C.  $\frac{1}{[\text{A}]_t} = \frac{1}{[\text{A}]_0} + Kt$  D.  $[\text{A}]_t = \frac{1}{K[\text{A}]_0}$
31. The decomposition of  $\text{N}_2\text{O}_5$  in  $\text{CCl}_4$  at  $45^\circ\text{C}$  is first order reaction with  $K = 6.32 \times 10^{-4} \text{ s}^{-1}$ . If  
 the initial concentration of  $\text{N}_2\text{O}_5$  is 0.4 mol/L. Calculate  $t_{1/2}$  :  
 A. 1096.5 Sec B. 1609.3 Sec. C. 1996 Sec. D. 1567 Sec.

32. The forward reaction constant for a certain chemical reaction is  $2 \times 10^4$  at  $25^\circ\text{C}$ . What will be the reverse equilibrium constant?

- A.  $5 \times 10^4$     B.  $0.5 \times 10^{-4}$     C.  $3 \times 10^{-4}$     D.  $0.3 \times 10^4$

33. As increase temperature the chemical equilibrium will changed towards?

$\text{PCl}_5(\text{g}) \leftrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ ,  $\Delta H = 92.5 \text{ KJ}$ . A. Left    B. Right    C. Undetermined    D. Has no effect

34. Which one of the following changes will shift the equilibrium to the left ?

- $\text{N}_2 + 3\text{H}_2 \leftrightarrow 2\text{NH}_3 + \text{heat}$     A. Increase pressure    C. Adding more  $\text{N}_2$  and  $\text{H}_2$   
B. Decrease temperature    D. Increase volume

35. The equilibrium constant expression for:  $\text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \leftrightarrow \text{H}^+(\text{aq}) + \text{HCO}_3^-(\text{aq})$

- A.  $K_c = \frac{[\text{H}^+][\text{HCO}_3^-]}{[\text{CO}_2][\text{H}_2\text{O}]}$     B.  $K_c = \frac{[\text{H}^+][\text{HCO}_3^-]}{[\text{CO}_2]}$   
C.  $K_c = \frac{[\text{CO}_2][\text{H}_2\text{O}]}{[\text{H}^+][\text{HCO}_3^-]}$     D.  $K_c = \frac{[\text{CO}_2]}{[\text{H}^+][\text{HCO}_3^-]}$

36.  $\text{KClO}_3$  decomposes according to the following reaction?  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$

If the rate of decomposition of potassium chlorate at a certain time is determined to be  $2.4 \times 10^{-2} \text{ MS}^{-1}$ . What is the rate of formation of  $\text{O}_2$  at the same time?

- A.  $1.6 \times 10^{-2} \text{ MS}^{-1}$     B.  $3.6 \times 10^{-2} \text{ MS}^{-1}$     C.  $2.4 \times 10^{-2} \text{ MS}^{-1}$     D.  $7.2 \times 10^{-2} \text{ MS}^{-1}$

37. When an acid donating a proton it becomes;

- A. Conjugate Acid    B. Conjugate Base    C. Amphiprotic    D. Hydroxide ion

38. Which of the following pairs cannot form a buffer solution?

- A.  $\text{CH}_3\text{COOH}/\text{CH}_3\text{COONa}$     B.  $\text{HCN}/\text{KCN}$     C.  $\text{NH}_3/\text{NH}_4\text{Cl}$     D.  $\text{HI}/\text{NaI}$

39. Which one of the following molecules does not have a coordinate covalent (dative) bond?

- A.  $\text{H}_3\text{O}^+$     B.  $\text{NH}_4^+$     C.  $\text{H}_2\text{CO}_3$     D.  $\text{NH}_3$

40. Bronsted –Lowry defines the terms acid and base using;

- A. Electron concept    B. Aqueous concept    C. Proton concept    D. Neutron concept

41. What would be the conjugate acid of  $\text{HSO}_4^-$

- A.  $\text{H}_2\text{SO}_4$     B.  $\text{H}^+$     C.  $\text{HSO}_4^-$     D.  $\text{SO}_4^{2-}$

42. When a small amount of strong base ,KOH is added to a buffer solution, ( $\text{CH}_3\text{COOH}/\text{CH}_3\text{COONa}$ ), which reaction happens to minimize the effect of the added base ?

- A.  $\text{Na}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq}) \rightleftharpoons \text{CH}_3\text{COONa}(\text{aq})$
- B.  $\text{OH}^-(\text{aq}) + \text{CH}_3\text{COOH}(\text{aq}) \rightleftharpoons \text{CH}_3\text{COO}^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- C.  $\text{CH}_3\text{COO}^-(\text{aq}) + \text{H}^+(\text{aq}) \rightleftharpoons \text{CH}_3\text{COOH}(\text{aq})$
- D.  $\text{CH}_3\text{COOH}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{H}_3\text{O}^+(\text{aq}) + \text{CH}_3\text{COO}^-(\text{aq})$

43. When sodium acetate,  $\text{CH}_3\text{COONa}$  is added to an aqueous solution of acetic acid ,  $\text{CH}_3\text{COOH}$  its pH;

- A. Decrease      B. Increase      C. May Decrease or Increase      D. remain constant

44. Which one of the following is acidic?

- A.  $[\text{OH}^-] = 3 \times 10^{-5} \text{ M}$     B.  $[\text{H}_3\text{O}^+] = 10^{-7} \text{ M}$     C.  $[\text{OH}^-] = 2 \times 10^{-9} \text{ M}$     D.  $[\text{H}_3\text{O}^+] = 2 \times 10^{-9} \text{ M}$

45. Calculate the concentration of hydronium ion,  $\text{H}_3\text{O}^+$  in a solution in which the concentration of hydroxide ion , $\text{OH}^-$  is  $10^4 \times [\text{H}_3\text{O}^+]$

- A.  $1 \times 10^{-14} \text{ M}$       B.  $1 \times 10^{-7} \text{ M}$       C.  $1 \times 10^{-18} \text{ M}$       D.  $1 \times 10^{-9} \text{ M}$

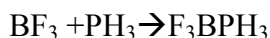
46. Which one of the following it indicate basic solution,

- A.  $[\text{H}_3\text{O}^+] < 10^{-7}$       B.  $[\text{OH}^-] < 10^{-7}$       C.  $[\text{H}_3\text{O}^+] > 10^{-7}$     D.  $[\text{OH}^-] = 10^{-7}$

47. Consider the following bases  $\text{ClO}_4^-$ ,  $\text{ClO}^-$ ,  $\text{ClO}_2^-$ , and  $\text{ClO}_3^-$ . What would be the correct order of Increasing base strength?

- A.  $\text{ClO}_4^- < \text{ClO}_3^- < \text{ClO}_2^- < \text{ClO}^-$
- B.  $\text{ClO}^- < \text{ClO}_2^- < \text{ClO}_3^- < \text{ClO}_4^-$
- C.  $\text{ClO}_3^- < \text{ClO}_4^- < \text{ClO}_2^- < \text{ClO}^-$
- D.  $\text{ClO}^- < \text{ClO}_3^- < \text{ClO}_2^- < \text{ClO}_4^-$

48. Which one is the Lewis acid in the following reaction;



- A.  $\text{BF}_3$       B.  $\text{PH}_3$       C.  $\text{F}_3\text{BPH}_3$       D.  $\text{OH}^-$

49. To a 50ml of a buffer solution that is 0.25M in HF and 0.25M in NaF, if 5ml of 2.4M of NaOH is added, what is the final PH of this buffer solution? ( $\text{PKa of HF}=3.17$ )
- A. 2.77    B. 2.80    C. 2.33    D. 3.17
50. For preparing a buffer solution of PH 5 by mixing sodium acetate and acetic acid, What would be the ratio of the concentration of salt and acid ( $\text{Ka}=10^{-4}$ )?
- A. 1:10    B. 10:1    C. 100:1    D. 1:100
51. A 0.1M solution of a weak acid, HX is 4.2% ionized. What is the dissociation constant for the acid?
- A.  $1.76 \times 10^{-4}$     B.  $1.8 \times 10^{-5}$     C.  $3.5 \times 10^{-8}$     D.  $4.5 \times 10^{-4}$
52. Which of the following ions act as both Bronsted acid & a Bronsted base except;
- A.  $\text{H}_2\text{O}$     B.  $\text{NH}_4^+$     C.  $\text{HCO}_3^-$     D.  $\text{H}_2\text{PO}_4^-$
53. What is the percent ionization of a 1.2M HF solution?  $\text{Ka}=6.8 \times 10^{-4}$
- A. 0.082%    B. 2.38%    C. 4.2%    D. 0.84%
54.  $\text{PKa}$  values of the acids X, Y and Z are 2.3, 6.7 and 5.2 respectively. Which of the following represents the decreasing order of acid strength?
- A.  $\text{Y} > \text{Z} > \text{X}$     B.  $\text{X} > \text{Z} > \text{Y}$     C.  $\text{Y} > \text{X} > \text{Z}$     D.  $\text{Z} > \text{X} > \text{Y}$
55. which of the following is neither of a Lewis base nor a Bronsted Lowry base :
- A.  $\text{H}_2\text{O}$     B.  $\text{NH}_3$     C.  $\text{BF}_3$     D.  $\text{F}^-$
56. What is the PH of a solution that consists of 0.55M  $\text{HCOOH}$  and 0.65M  $\text{HCOONa}$ ? ( $\text{Ka for HCOOH}=1.7 \times 10^{-4}$ )
- A. 3.8    B. 8.3    C. 4.8    D. 5.8
57. Given the reaction:  $\text{HSO}_4^- + \text{HPO}_4^{2-} \leftrightarrow \text{SO}_4^{2-} + \text{H}_2\text{PO}_4^-$  Which pair represents an acid and its conjugate base?
- A.  $\text{HSO}_4^-$  and  $\text{SO}_4^{2-}$     B.  $\text{HSO}_4^-$  and  $\text{HPO}_4^{2-}$   
 C.  $\text{SO}_4^{2-}$  and  $\text{H}_2\text{PO}_4^-$     D.  $\text{SO}_4^{2-}$  and  $\text{HPO}_4^{2-}$
58. Consider that  $\text{ka of HCO}_2\text{H} > \text{CH}_3\text{COOH} > \text{HOBr} > \text{C}_6\text{H}_5\text{OH}$  which of the following aqueous solutions will have the highest PH?
- A. 0.2M  $\text{NaOBr}$     B. 0.2M  $\text{HCO}_2\text{Na}$     C. 0.2M  $\text{C}_6\text{H}_5\text{ONa}$     D. 0.2M  $\text{CH}_3\text{COONa}$

59. What is the  $\{ \text{H}_3\text{O}^+ \}$  for a solution with a POH of 9?  
 A.  $10^{-14}$       B.  $10^{-5}$       C.  $10^{-7}$       D.  $10^{-6}$
60. Of the following one is not a colligative property of a solution?  
 A. Freezing point depression   B. Boiling point elevation   C. Vapor pressure   D. Osmotic pressure
61. What is the normality of a solution that contains 14g of KOH in 500ml of solution? (M.Wt: KOH = 56g/mol)  
 A. 0.5N    B. 0.3N    C. 0.2N    D. 1.4N
62. What is the mass of urea ( $\text{NH}_2\text{CONH}_2$ ) required in making 2.5 kg of 0.25 molal aqueous solution? (Molar mass of urea is 60g/mol)  
 A. 37.5 g    B. 25 g    C. 6g    D. 31g
63. Calculate the mole fraction of ethylene glycol ( $\text{C}_2\text{H}_6\text{O}_2$ ) in aqueous solution containing 20% of  $\text{C}_2\text{H}_6\text{O}_2$  by mass. . (Molar mass of ethylene glycol is  $62 \text{ g mol}^{-1}$ .)  
 A. 0.068    B. 0.932    C. 0.2    D. 0.8
64. How many milliliters of 0.38M HCl are needed to react with 16.2 g of  $\text{CaCO}_3$ ?  $\text{HCl (aq)} + \text{CaCO}_3(\text{s}) \rightarrow \text{CaCl}_2(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$  [Molar mass of  $\text{CaCO}_3$  is 100 g per mol]  
 A. 845 ml    B. 83.8 ml    C. 928.8ml    D. None
65. In the reaction :  $2\text{NaI}(\text{aq}) + \text{Pb}(\text{NO}_3)_2(\text{aq}) \rightarrow \text{PbI}_2(\text{s}) + 2 \text{NaNO}_3(\text{aq})$  the spectator ions are:  
 A.  $\text{Pb}^{2+}$  &  $\text{I}^-$     B.  $\text{NO}_3^-$  &  $\text{Na}^+$     C.  $\text{Pb}^{2+}$  &  $\text{NO}_3^-$     D.  $\text{NO}_3^-$  &  $\text{I}^-$
66. How many grams of  $\text{Ca}(\text{OH})_2$  are contained in 1500 ml of 0.0250M  $\text{Ca}(\text{OH})_2$  solution?  
 A. 3.17g    B. 2.78g    C. 1.85g    D. 2.34g
67. What volume of 0.50M KOH would be required to neutralize completely 500ml of 0.25M  $\text{H}_3\text{PO}_4$  solution?  
 A.  $2.5 \times 10^2 \text{ ml}$     B.  $1.4 \times 10^3 \text{ ml}$     C.  $7.5 \times 10^2$     D. None
68. The mole fraction of  $\text{C}_6\text{H}_6$  in a solution containing 37.5g of camphor in 39.0g of benzene was 0.667. The molecular mass of camphor is found to be :  
 A. 37.5      B. 150      C. 112.5      D. 300
69. Which of the following pair is not acid base conjugate pair?  
 A.  $\text{NH}_3, \text{NH}_4^+$     B.  $\text{HC}_2\text{H}_3\text{O}_2, \text{C}_2\text{H}_3\text{O}_2^-$     C.  $\text{HCO}_3^-, \text{CO}_3^{2-}$     D.  $\text{H}_2\text{PO}_4^{2-}, \text{PO}_4^{3-}$
70. A battery acid is 4.27M sulfuric acid aqueous and has density of 1.25g/ml .What is the molality of the solution?  
 A. 0.0514m    B. 5.14m    C. 0.098m    D. 0.514m
71. A chemist wants to make 2.5L of a 0.100M KCl solution .How much KCl in grams should the chemist use?  
 A. 42.3g    B. 18.75g    C. 24g    D. 74.5g

72. Which of the following compounds would give the highest boiling elevation when 100gram of each are dissolved in 1kg of water? At. Mass: Na = 23, C=12, O=16, S=32, H=1, Cl=35.5)
- A.  $(\text{NH}_4)_2\text{SO}_4$       B. NaCl      C.  $\text{NH}_4\text{NO}_3$       D.  $\text{C}_6\text{H}_{12}\text{O}_6$
73. What is the Concentration of Sodium chloride in water needed in Order to produce an aqueous solution that has an identical Osmotic pressure ( isotonic) with blood.
- ( $\pi = 7.70 \text{ atm}$  at  $25^\circ\text{C}$  ,  $R = 0.082 \text{ L/atm. mol}$ )
- A.  $0.003 \text{ mol/L}$       C.  $0.1575 \text{ mol/L}$   
 B.  $0.006 \text{ mol/L}$       D.  $0.315 \text{ mol/L}$
74. A bottle of Tej contains 10.5% of ethanol by volume. The density of ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) is  $0.79 \text{ g/cm}^3$ . what is the molality of ethanol? (atomic mass H=1, C=12, O=16)
- A. 0.1      B. 0.228      C. 1.8      D. 2.28
75. 500ml of glucose solution contains  $6.02 \times 10^{22}$ . The concentration of solution is
- A. 0.1M      B. 1.0M      C. 0.2M      D. 2.0M
76. Which of the following compounds would be the most soluble in non-polar solvent, such as  $\text{CCl}_4$ ? A.  $\text{H}_2\text{O}$       B.  $\text{CH}_3\text{CH}_2\text{OH}$       C.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$       D.  $\text{C}_6\text{H}_6$
77. If equal volumes of  $0.10 \text{ mol/L HCl(aq)}$  solution and  $0.10 \text{ mol/L CH}_3\text{COOH(aq)}$
- A. It would have a higher hydronium ion concentration.  
 B. It would have a higher pH.  
 C. It would produce a larger volume of hydrogen gas when reacted with zinc.  
 D. It would require a greater volume of  $0.10 \text{ mol/L NaOH (aq)}$  solution for neutralization
78. How many equivalents of phosphoric acid are contained in 300 mL of 4.00 M phosphoric acid? (Assume the acid is to be completely neutralized by a base.)
- A. 0.600 eq      B. 1.20 eq      C. 2.40 eq      D. 3.60 eq
79. Which of the following is solid –liquid solution?
- A. Natural gas      B. Aqueous sugar solution      C. Brass      D. Gold
80. The solubility of a gas in a liquid solvent increases as \_\_\_\_\_
- a. Temperature of the solution increases      B. pressure increases      C. Temperature of the solution decreases      D. B and C
81. The solubility of sodium selenate,  $\text{Na}_2\text{SeO}_4$ , is  $84 \text{ gm/100 gm}$  of water at  $35^\circ\text{C}$ . if a solution obtained by dissolving  $92 \text{ gm}$  of  $\text{Na}_2\text{SeO}_4$  in  $200 \text{ gm}$  of water at  $25^\circ\text{C}$ , what do you call this solution?
- a. Diluted      B. saturated      C. unsaturated      D. supper saturated
82. What is molarity of the salt produced in the reaction of  $200 \text{ ml}$  of  $0.100 \text{ M HCl}$  with  $100 \text{ ml}$  of  $0.500 \text{ M KOH}$ ?      A.  $0.0325 \text{ M}$       B.  $0.0472 \text{ M}$       C.  $0.0667 \text{ M}$       D.  $0.0864 \text{ M}$

83. The vapor pressure of  $\text{CCl}_4$  and  $\text{CHCl}_3$  in a solution is 109.2Kpa and 74.8Kpa respectively at  $300^\circ\text{C}$ . calculate the total vapor pressure of a mixture containing 1mole of each  
a. 82Kpa B. 64Kpa C. 92Kpa D. 102Kpa
84. Which 1% aqueous solution will have the highest boiling point?  
a. Glucose B.  $\text{ZnSO}_4$  C. NaCl D. urea
85. A sample of potable water was found to contain 20ppm (by mass) of chloroform ( $\text{CHCl}_3$ ). Calculate the molality of chloroform in the water sample  
a.  $1.67 \times 10^{-4}\text{m}$  B.  $4.5 \times 10^{-2}\text{m}$  C.  $1.2 \times 10^{-2}\text{m}$  D.  $6.1 \times 10^{-3}\text{m}$
86. Consider the reaction:  $2\text{Al(s)} + 3\text{H}_2\text{SO}_4(\text{aq}) \longrightarrow \text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{H}_2(\text{g})$   
What minimum volume of 4.0M  $\text{H}_2\text{SO}_4$  is required to produce 15.0L of  $\text{H}_2$  at STP?  
a. 0.67L B. 0.167L C. 0.78L D. 0.98L
87. What products are formed during the electrolysis of a concentrated aqueous solution of sodium chloride? A.  $\text{Cl}_2$  B.  $\text{Cl}_2$  and  $\text{H}_2$  C. NaOH and  $\text{Cl}_2$  D.  $\text{Cl}_2$ ,  $\text{H}_2$  and NaOH
88. For the following hypothetical equation, in aqueous solution, what is the correct representation of the notation?  $\text{A(s)} + \text{B}^{2+}(\text{aq}) \rightarrow \text{A}^{2+}(\text{aq}) + \text{B(s)}$   
A.  $\text{A(s)} \setminus \text{A}^{2+}(\text{aq}) \setminus \setminus \text{B}^{2+}(\text{aq}) \setminus \setminus \text{B(s)}$  C.  $\text{B}^{2+}(\text{aq}) \setminus \setminus \text{B(s)} \setminus \setminus \text{A}^{2+}(\text{aq}) \setminus \setminus \text{A(s)}$   
B.  $\text{A}^{2+}(\text{aq}) \setminus \setminus \text{A(s)} \setminus \setminus \text{B(s)} \setminus \setminus \text{B}^{2+}(\text{aq})$  D.  $\text{B(s)} \setminus \setminus \text{B}^{2+}(\text{aq}) \setminus \setminus \text{A}^{2+}(\text{aq}) \setminus \setminus \text{A(s)}$
89. Consider the reaction:  
 $\text{Cu}^{2+}(\text{aq}) + \text{Fe(s)} \leftrightarrow \text{Cu(s)} + \text{Fe}^{2+}(\text{aq})$ ,  $E^\circ = 0.78\text{V}$   
What is the value of E when  $[\text{Cu}^{2+}]$  is equal to 0.040 M and  $[\text{Fe}^{2+}]$  is equal to 0.40 M?  
A. 0.72V B. 0.75V C. 0.81V D. 0.84 V
90. For the electrochemical cell represented by:  
 $\text{Zn} \setminus \text{Zn SO}_4(\text{aq}) \setminus \setminus \text{Cu SO}_4(\text{aq}) \setminus \setminus \text{Cu (s)}$

The standard reduction potentials for  $\text{Cu}^{2+} \setminus \text{Cu}$  and  $\text{Zn}^{2+} \setminus \text{Zn}$  are +0.34 and -0.76V ,respectively. What will be the cell reaction that occurs spontaneously and its cell voltage?

$E^\circ(\text{V})$

- |                                                              |      |
|--------------------------------------------------------------|------|
| A. $\text{Cu} + \text{Zn}^{2+} = \text{Cu}^{2+} + \text{Zn}$ | 1.10 |
| B. $\text{Zn} + \text{Cu}^{2+} = \text{Zn}^{2+} + \text{Cu}$ | 0.42 |
| C. $\text{Cu}^{2+} + \text{Zn}^{2+} = \text{Cu} + \text{Zn}$ | 0.42 |
| D. $\text{Cu}^{2+} + \text{Zn} = \text{Cu} + \text{Zn}^{2+}$ | 1.10 |