DB-003-001608

B. Sc. (Sem. VI) (CBCS) Examination

April / May – 2015

Physical & Analytical Chemistry : C-603

Faculty Code : 003

Subject Code : 001608

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) Answer the MCQ in the answer book.

(2) Digits on right hand side indicate marks.

1 Answer the following MCQ :   **20**

(1) Who has stated third law of thermodynamics ?

(A) Nernst

(B) Planck

(C) Lewis and Randall

(D) Berthelot

(2) Debye-Huckel equation reliable only for :

(A) Very dilute solution

(B) Concentrated solution

(C) Non aqueous solution

(D) None of these

(3) For $BaCl_2$ $a_\pm =$

(A) $(36)^{1/5} f_\pm C$ (B) $(27)^{1/4} f_\pm C$

(C) $(4)^{1/3} f_\pm C$ (D) $\left(f_\pm C\right)^{1/2}$

(4) With the help of value of K, we can calculate the value of :

(A) $\Delta G°$

(B) $\Delta H°$

(C) $\Delta S°$

(D) None of these

(5) Unit of specific conductance is.........

(A) $Ohm^{-1}\ cm^{-1}$

(B) $Ohm\ cm^{-1}$

(C) $Ohm\ cm$

(D) None of these

(6) The _____ ion possesses the greatest mobility of ion.

(A) H^+

(B) OH^-

(C) CH_3COO^-

(D) Cl^-

(7) 1ppm = _____.

(A) 0.1 french

(B) 0.01 french

(C) 0.001 french

(D) 1.0 french

(8) T.S.S. means..........

(A) Total Suspended Solids

(B) Total Solid Suspended

(C) Turbid Suspended Solids

(D) Turbid solid scale

(9) Which compound has comparative maximum entropy at 25°C ....

    (A) Glass

    (B) NaCl

    (C) Perfect crystal

    (D) Petrol

(10) If molar heat of fusion of water is 6019 Joule, what is value of specific heat of fusion ?

    (A) 6.019

    (B) 0.0029

    (C) 108342

    (D) 334.39

(11) Which of the following adsorbents is used for column adsorption chromatography has maximum adsorption power ?

    (A) Silica gel   (B) MgO

    (C) Aluminium oxide   (D) $CaCO_3$

(12) Best TLC plate prepared by the method of

    (A) Pouring   (B) Spreading

    (C) Spraying   (D) Dipping

(13) If in metal-amalgam electrode concentration of Hg is increased, the emf of electrode will.........

    (A) increase   (B) decrease

    (C) remian same   (D) None of these

(14) Ion exchange resins have been widely used for.........

   (A) Water softening

   (B) Water deionisation

   (C) Ion separation

   (D) All of these

(15) Which chromatography is used for components having low R_f values :

   (A) Ascending

   (B) Descending

   (C) Circular

   (D) Two dimensional

(16) Which of the following electrodes is reversible to hydrogen ion ?

   (A) Calomel

   (B) $Sb-Sb_2O_3$

   (C) Silver - Silver chloride

   (D) None of these

(17) _____ rules are used for the reaction of EDTA titration.

   (A) Debye

   (B) Kohlaraush

   (C) Welcher

   (D) Gibbs

(18) Temporary hardness is due to _____ salts.

    (A) Ca, Mg chloride

    (B) Ca, Mg carbonate

    (C) Ca, Mg, bicarbonate

    (D) Ca, Mg sulphate

(19) To avoid correction of volume for conductometric titration the titrant is taken _____ times concentrated.

    (A) 2   (B) 3

    (C) 4   (D) 10-20

(20) Acidity of water is due to the presence of :

    (A) Organic acid   (B) Mineral acid

    (C) Salt of S.A. + W.B   (D) All of these

2   (a)   Answer any three questions :   **6**

    (1) Write down the types of concentration cell.

    (2) Define partial molar property.

    (3) Write the cell reaction of the cell

$$Hg - Pb\left(C_1\right) | PbSO_{4(aq)} | Pb - Hg\left(C_2\right)$$

    (4) Give mathematical form of Nernst distribution law and Henry's law.

    (5) Calculate value of valency factor of $BaCl_2$.

    (6) Calculate μ (ionic strength) of solution. When 12 gram. NaOH is dissolved in 3 kg of water.

  (b)   Answer any three questions :   **9**

    (1) How to determine pH using Hydrogen electrode with the help of emf measurement.

(2) The valency of mercurous ion is 2. Explain.

(3) Application of Third law of thermodynamics. Explain.

(4) State Henry's law.

(5) Explain Activity, Activity co-efficient and Average activity.

(6) Discuss solubility method for the determination of activity coefficient.

(c) Answer any two questions : 10

(1) Derive Gibbs-Duhem equation.

(2) How can we measure the absolute value of entropy of any substance at its boiling point ? Explain with help of third law of thermodynamics.

(3) How will you determine degree of hydrolysis based on emf measurement.

(4) Explain concentration cell with transference.

(5) Calculate change in entropy when 10 gm of tin heated up from 20°C to 300°C temperature.

$[\Delta H_t = 14$ Cal/gm. $C_{p(S)} = 0.055$ cal/gm.

$C_{p(1)} = 0.064$ cal/gm MP of tin = 232°C]

3 (a) Answer any three questions : 6

(1) Define specific conductance.

(2) Give two merits and demerits of hydrogen electrode.

(3) Give classification of chromatography.

(4) Give most common properties of all ion exchangers in ion exchange chromatography.

(5) Give structure and name of EDTA.

(6) Give three reduction potential value for three different concentrations of KCl in calomel electrode.

(b) Answer any three questions : **9**

(1) What is conductivity water ? How will you prepare conductivity water ?

(2) What is meant by R_f and R_X value ? Give factors affecting on the R_f value.

(3) Give advantages of TLC over other chromatography.

(4) Give structure of murexide indicator and explain its working method.

(5) Write short note on Glass-electrode.

(6) Explain Welcher Rule for EDTA titration.

(c) Answer any two questions : **10**

(1) Explain redox titration of $FeSO_4 \rightarrow K_2Cr_2O_7$ by potentiometry.

(2) Explain in detail GLC technique and use of GLC.

(3) Explain how to determine dissociation constant of weak acid using emf. measurement.

(4) Explain conductometric titration between a strong base against a mixture of a weak and strong acid.

(5) Describe precipitation titration by conductometery.

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