Model questions

M.SC CHEMISTRY –SEMESTER-IV

PAPER-EC-4 (PHYSICAL SPECIAL PAPER)

GROUP-A

1-Polarisation may occur at the?

A. Cathode B. Anode C .Both A and B D. Can not say

2-What is the symbol of overvoltage?

A. Eta B. Beta C. Delta D. Alpha

3-Cathodic polarization always --------- the corrosion rate

A. Increases B. Reduces C. Remain same D. None of the above

4-In electrolysis oxidation takes place at:

A. Both the electrodes B. Cathode C. Anode D. In the solution.

5-Which of the following statement s is comprehensively true for the exchange current density?

A. $i_a=i_c=i_0$

B. The system is a reversible non-corroding type

C. The system is at condition of non –steady state.

D. Both A and B are correct.

6-The concentration overpotential of 0.015V is applied to deposit gold from an electrolyte at 298K with limiting current density of 400A/cm^2. The value of current density(A/cm^2) at which gold is deposited is:

A. 105 to 110 B. 272 TO 280 C. 156 TO 162 d. 82 to 90

7.The Debye-Huckel limiting law correlates----------.

A. Activity of electrolyte with ionic strength.

B. Mean ionic activity coefficient of electrolyte with ionic strength.

C. Molality of electrolyte with ionic strength.

D. Mean molality of electrolyte with ionic strength.

8-Debye –Huckel limiting law is applicable only for----------

A. Dilute solution of strong electrolytes

B. Strong solution of strong electrolytes

C. Dilute solution of weak electrolytesw

D. Strong solutions of weak electrolytes.

9- The difference between actual applied potential and theoretical reversible potential of involved galvanic cell is known as----------.

A . Back emf B. Decomposition potential C. Over voltage D. Polarization.

10. Over voltage is given by the relation----------.

A. $\eta = E_d - E_r$ B. $\eta = E_d + E_r$ C. $\eta = E_d / E_r$ D. $\eta = E_r/E_d$

11. According to Tafels equation, overvoltage is given by the relation ----------

A. $\eta = a - b \log i$ B. $\eta = b - a \log i$ C. $\eta = a+b \log i$ D. $\eta = b + a \log i$

12- As current density increases , overvoltage ----------

A. Increases B. Decreases C. Remain Same D. First increases then decreases.

13-As the effective surface area of electrode increases , overvoltage----------.

A. Increases B. Decreases C. Remain same D. First increases then decreases.

14- Which of the following parameters is not related to Butler-Volmer equation in the activation controlled mode?

A. Electrode potential B. Faradic current C. Exchange current density D. Turbulence in the electrolyte.

15. Debye- Huckel limiting law for the mean activity coefficient of an electrolyte is ---------.

A. $\log \pm = -AZ_+Z_- (\mu)^{1/2}$ B. $\log \pm = -A Z_- Z_- (\mu)^{1/2}$ C. $\log \pm = -A Z_+Z_+ (\mu)^{1/2}$ D. $\log \pm = +AZ_+Z_- (\mu)^{1/2}$

16.In Debye-Huckel Onsagar equation the value of constant A =----------

A. $82.4 / (DT)^{1/2}\eta$ B. . $82.4 / (DT)\eta$ C. $82.4 / (DT)2\eta$ D. None of the above

17. Destruction of material due to its interaction with environment called ----------

A. Corrosion B. Collision C. Erosion D. Both (a) & (b)

18-The interaction between the solute and solvent molecule is called ----------.

A, Ion-solvent interaction B. Solvent interaction C . Ion-Ion interactions D. Solvent-solvent interaction.

19. The mobility of ion ---------- due to electrophoretic force.

A. Increases B. Decreases C. Remain constant D. Both (a) and (b)

20.At high voltage the conductace of electrolyte solution increases due to ------- effect.

A. Debye B. Falkenhagen C. Wien D. Debye-Falkenhagen.

21.A catalyst function by;-

A. Increasing the forward reaction B. Increasing the concentration of the product C. Changing the equilibrium constant D. Reducing the activation energy of the reaction.

22. B.P.BELOUSOV studied the reactions of

A. $Ce^{+\#}/Ce^{+4}$ B. Zn^{+}/Cu^{2+} C. Fe^{++}/Fe^{+++} D. None of the above.

23.B Z reactions deals with

A. Photochemical reactions B. Free energy C. Electrochemical reaction D. Oscillatioryphenomena.

24. Lotka-Voltera Mechanism is study of

A. Salt bridge B. Gravimetric analysis C. Oscillatory phenomenon D. Kinetics of solution reactions

25. Acid base catalysis are catalysed by

A. H^+ and OH^- ions B. H_3o^+ and H^+ C. NO_3- and SO_4^{-2} D. None of above.

26.Howmany types of catalysis??

A. Two B. Three C. Four D. Five

27.OREGONATOR is study of

A. Thermodynamics B. Quantum chemistry C. Photochemistry D. Oscillatory reactions.

28. BISTABILITY is part of

A. Quantum chemistry B. Third law of thermodynamics C. Oscillatory reactions D. None of above.

29. Primary salt effect deals with

A. Catalysis B. Photochemistry C. E.M.F D. None of above.

30. HAMMETT & BRONSTED Equation deals with

A. Third law of thermodynamics B. Phase rule C. Catalytic reactions.

SECTION –B (Short questions)

1- Differentiate between Faradic and Nonfaradic current.

2- Discuss the factors affecting the electrode reactions.

3- Define current density. How it is calculated near electrode.

4- Write short note on overvoltage.

5- Discuss different types of overvoltage.

6- What is electrical double layer? How it is generated?

7- Discuss different electrode reactions with various steps..

8. Illustrate the kinetics of electron transfer reactions. And established rate constant K_{0x}, k_{red}..

9- Differentiate between Cathodic protection and anodic protection

10- What is polarization ? discuss different types of polarization.

11- Explain Exchange current density

12 . Write Tafel equation and Tafel plot..

13.state Debye Huckel theory of strong electrolyte.

14- Write short note on electrocatalysis

15- Dis cuss theories of Acid base catalysis

16- What are Arhenious compleses.. how it is achived?

17- Discuss Hammet equation

18-Discuss Lotka- Voltera Model

19- write note on Bronsted catalysis law

20- write note on Auto catalysis.

SECTION –C (Long questions)

1-Deduce Debye – Huckel limiting law and Debye-Huckel-Onsager equation.

2-Discuss the various theories of structure of electrical double layer.

3-Derive Butler-Volmer equation

4- What are the factors influencing the rate of corrosion –metal as well as its prevention.

5- What is passivity? Discuss Characteristic of passivity theory and and mechanism of passivation.

6- Disscuss the factors affecting electrode reactions and derive Nernst equation.

7-Discuss theory of acid- base catalysis and explain the effect of salt on acis- base catalysis.

8- Derive Lippmann equation

9-Write note on overpotential. How it is measured? Discuss the theories of overpotential.

10- What are Oscillation reaction? Explain with suitable examples . Represent Lotka-Voltera model.