

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086

(For candidates admitted from the academic year 2008-09)

SUBJECT CODE: CH/MC/PC64

B.Sc. DEGREE EXAMINATION, APRIL 2011

BRANCH IV - CHEMISTRY

SIXTH SEMESTER

Reg. No

COURSE : MAJOR-CORE

PAPER : PHYSICAL CHEMISTRY - III

TIME : 30 MINUTES

MAX. MARKS : 30

SECTION – A

TO BE ANSWERED ON THE QUESTION PAPER ITSELF.

ANSWER ALL THE QUESTIONS.

(30x1=30)

I. Choose the correct answer:

(10 X 1 = 10)

- As the temperature increases, the reaction rate
 - decreases and then increases
 - decreases
 - increases
 - stays the same
- Adsorbate is that substance
 - which concentrates on the surface
 - where adsorption takes place
 - which evaporates from the surface of metals
 - none of these
- The adsorption of hydrogen on charcoal is
 - physical adsorption
 - desorption
 - chemisorption
 - none of these
- For strong electrolytes, the degree of dissociation is
 - nearly equal to zero
 - nearly equal to one
 - nearly equal to infinity
 - nearly equal to 0.5
- With rise in temperature, the conductance of an electrolytic solution generally
 - decreases
 - increases
 - remains constant
 - reaches zero value
- Ostwald's dilution law is applicable to
 - all electrolytes
 - strong electrolyte
 - weak electrolyte
 - non- electrolyte
- Which metal is used as a coating on steel to limit corrosion?
 - Sodium
 - Calcium
 - Potassium
 - Zinc
- Which of the following can be used to measure pH?
 - a glass electrode
 - a concentration cell
 - a hydrogen electrode
 - all of these
- Sulphates of Ca, Ba and Sr exhibit
 - chemiluminescence
 - fluorescence
 - phosphorescence
 - none of these
- The half – life of a first order process
 - depends on the reactant concentration raised to the first power
 - is inversely proportional to the square of the reactant concentration
 - is inversely proportional to the reactant concentration
 - is totally independent of the reactant concentration

II. Say True or False:**(5 X 1= 5)**

11. In a galvanic cell, reduction occurs at the anode.
12. The salt bridge maintains the electrical neutrality in each half cell.
13. It is the secondary reaction in which absorption of radiation takes place.
14. The rate constant for a reaction depends upon the nature of reactant.
15. Increase in surface area of the adsorbent increases the total amount of the gas adsorbed.

III. Match the following:**(5 X 1 = 5)**

- | | |
|-------------------------------------|--------------------------|
| 16. Multimolecular layers | a) 96500 coulombs |
| 17. The rate determining step | b) second order reaction |
| 18. One Faraday | c) physical adsorption |
| 19. Alkaline hydrolysis of an ester | d) Hittorf's method |
| 20. Transport number | e) the slowest reaction |

IV. Fill in the blanks:**(5 X 1 =5)**

21. In chromatographic analysis, the principle used is -----.
22. The unit of equivalent conductance is -----.
23. The emission of light as a result of chemical reaction is called -----.
24. The species that are formed in one step of reaction mechanism and used up in another step are called -----.
25. When a strong acid is titrated against a strong base, the end point is the point of ----- conductance.

V. Answer in a line or two:**(5 X 1 = 5)**

26. Define over voltage.

27. Write Henderson- Hasselbalch equation.

28. Define half- life period.

29. Write Nernst equation.

30. Define degree of dissociation.

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COURSE : MAJOR – CORE

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TIME : 2 ½ HOURS

MAX. MARKS: 70

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5x6=30)

1. Explain Lindemann's theory of unimolecular reactions.
2. Discuss Freundlich adsorption isotherm of a gas on a solid surface.
3. State and explain Ostwald's dilution law. Can this law be applied to the dissociation of HCl in aqueous solution?
4. Describe the construction and working of calomel electrode.
5. State the principle of conductometric titrations. Draw the titration curve for weak acid with a strong base.
6. Derive liquid junction potential.
7. Explain photosensitization with an example.

SECTION – C

ANSWER ANY TWO QUESTIONS:

(2x20=40)

8. (a) Derive the rate constant for a first order reaction. (5)
(b) Explain the use of polarimetry in the study of kinetics. (5)
(c) Distinguish between physical adsorption and chemisorption. (5)
(d) What are consecutive reactions? Explain with an example. (5)
9. (a) Discuss the photolysis of aldehydes and ketones. (5)
(b) Explain the theory of absolute reaction rates. (10)
(c) How will you calculate Arrhenius parameters? (5)
10. (a) Explain the Debye-Huckel theory of strong electrolytes. (5)
(b) Discuss the applications of Kohlrausch's law. (10)
(c) Write the importance of electrochemical series. (5)

11. (a) The solubility of CuBr is found to be 2.0×10^{-4} mol/lit at 25°C . Calculate K_{sp} value for CuBr. (5)
- (b) Give an example for electrolytic cell with transference. Write the cell reaction and the expression for the emf of this cell. (5)
- (c) Explain the working of Lead storage battery. (5)
- (d) Deduce an expression for the degree of hydrolysis of a salt of a weak acid and a strong base. (5)
