

L 1061

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

First Semester

Civil Engineering

CY 1101 --- CHEMISTRY --- I

(Common to all branches Except Marine Engineering)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A --- (10 × 2 = 20 marks)

1. Define EMF of an electrochemical cell.
2. Draw a representative plot of conductometric titration of a strong acid versus strong base?
3. What is the entropy change for the conversion of 1 mole of liquid water at 100°C to steam at 100°C? (Molar heat of vaporization of water = 40.662 kJ).
4. What is Helmholtz work function, A?
5. Write the nuclear reaction of decay of Polonium?
6. Write the relationship which shows the influence of temperature on reaction rate.
7. What is Freundlich adsorption isotherm?
8. State Beer Lamberts law.
9. What are the various types of electronic transitions?
10. Mention any two advantages of instrumental methods of analysis.

11. (i) Write any three applications of IR spectroscopy? (3)
- (ii) What is the principle involved in flame photometry. (4)
- (iii) Explain the various components and working of UV-visible spectrophotometer. (8)
12. (a) (i) What are concentration cells? (3)
- (ii) Explain the construction and use of calomel electrode. (5)
- (iii) State Kohlrausch law of independent migration of ions. Explain any two of its applications. (8)

Or

- (b) (i) Calculate the half cell potential at 298 K for the reaction, $\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{s})$ if $[\text{Zn}^{2+}]$ is 5.0 M and $E^{\circ}\text{Zn}^{2+}/\text{Zn} = -0.76 \text{ V}$. (3)
- (ii) Deduce the Nernst equation for the EMF of a cell. (5)
- (iii) What is polarization? Explain decomposition potential. (8)
13. (a) (i) Explain intensive and extensive properties with suitable examples. (3)
- (ii) Calculate the work done when 1 mole of an ideal gas expands isothermally and reversibly from a volume of 10 L to a volume of 20 L at 27°C. Gas constant = 8.314 J/K/mol. (5)
- (iii) Derive Van't Hoff isotherm. (8)

Or

- (b) (i) Explain adiabatic and isothermal processes with suitable examples. (3)
- (ii) One mole of an ideal gas expands isothermally from 0.1 L to 1.0 L at 27°C. Calculate the change in free energy of the gas? Gas constant = 8.314 J/K/mol. (5)
- (iii) Derive Gibbs Helmholtz equation from the fundamental thermodynamic properties. (8)

14. (a) (i) Define order of a reaction. Give any two examples of second order reaction. (3)

(3) (ii) Derive the kinetics of opposing reactions which are of first order. (4)

(5) (iii) Discuss the theory of absolute reaction rate. (3)

Or

(b) (i) Define half life period. How does it vary with the initial concentration of the reactant in a reaction of second order? (3)

(3) (ii) What are parallel reactions? Derive the kinetics of a parallel reaction? (5)

(5) (iii) The following data were obtained in the hydrolysis of ethyl acetate using equal concentration of ester and NaOH.

Time (in min.) Volume of HCl

0 16.00

5 10.24

15 6.13

25 4.32

35 3.41

Show that the reaction is of second order. (8)

15. (a) (i) Define the terms adsorbent and adsorbate giving suitable examples. (3)

(ii) What are the characteristics of catalysts? (5)

(iii) Deduce Langmuir adsorption equation. (8)

Or

(b) (i) Mention any three factors which influence adsorption of a gas on a solid. (3)

(ii) Write an account of adsorption chromatography. (5)

(iii) Derive the kinetics of enzyme catalysis. (8)