

B.E/B.TECH. DEGREE EXAMINATIONS: DECEMBER 2008

First Semester

U07 CY101 CHEMISTRY-I

(Common to All Branches)

Time: Three Hours**Maximum Marks: 100****Answer ALL Questions:-****PART-A (20×1=20 Marks)**

- Cells which do not obey the conditions of thermodynamic reversibility are called
A. Concentration cells B. Reversible cells
C. Irreversible cells D. Galvanic cells
- An example for a primary standard electrode is:
A. Calomel electrode B. Metal-metal ion electrode.
C. Hydrogen electrode. D. Glass electrode.
- Electrochemical series is the arrangement of electrodes in the:
A. Increasing order of their standard reduction potential values
B. Decreasing order of their standard reduction potential values
C. Increasing order of their standard oxidation potential values
D. Increasing order of their electronegativity.
- Which of the following electrodes is suitable for the determination of the concentration of a particular ion present in a solution?
A. Silver-Silver chloride electrode B. Amalgam electrode
C. Redox electrode D. Ion selective electrode
- In isochoric process which of the following is kept constant?
A. Volume B. Pressure
C. Both pressure and volume D. Temperature
- The degree of randomness is given by:
A. Enthalpy B. Free energy
C. Entropy D. Work function
- First law of thermodynamics is also known as:
A. Kirchoff's law B. Lavoisier- Laplace law
C. Hess's law D. Law of conservation of energy
- Heat by itself will not pass from a body at a lower temperature to one at a higher temperature. This statement is given by:
A. van't Hoff B. Kelvin
C. Clausius D. Gibb's-Helmoltz
- The sum of powers of the concentration terms in the rate law is known as :
A. Molecularity B. Order
C. Rate constant D. Rate

10. Activation energy of a reaction is the energy:
 A. Released during the reaction
 B. Evolved when activated complex is formed
 C. Needed to form one mole of the product
 D. Needed to overcome the energy barrier
11. Nano³ in Nanoscience means:
 A. 1×10^{-6} m
 B. 1×10^{-7} m
 C. 1×10^{-12} m
 D. 1×10^{-9} m
12. Single walled nanotube is used in the fuel cell as:
 A. Anode
 B. Cathode
 C. Electrolyte
 D. Insulator
13. Adsorption is:
 A. An adiabatic process
 B. An isothermal process
 C. An exothermic process
 D. An endothermic process
14. Which of the following is termed sorption?
 A. Adsorption
 B. Absorption
 C. Condensation
 D. Both adsorption and absorption
15. The catalytic activity in heterogeneous catalysis is maximum when the catalyst is:
 A. In gaseous phase
 B. In liquid phase
 C. In finely divided state
 D. Large
16. The substance which increases the activity of a catalyst is called:
 A. Catalytic poison
 B. Negative catalyst
 C. Autocatalyst
 D. Promoter
17. Bathochromic shift is :
 A. Shift to lower wavelength
 B. Shift to higher wavelength
 C. An increase in intensity
 D. A decrease in intensity
18. Which one of the following transitions is forbidden?
 A. $n \rightarrow \pi^*$
 B. $\pi \rightarrow \pi^*$
 C. $\sigma \rightarrow \sigma^*$
 D. $n \rightarrow \sigma^*$
19. The wavelength of IR region lies between:
 A. 8000 and 350000 \AA°
 B. 4000 and 8000 \AA°
 C. 400 and 750 nm
 D. Below 4000 \AA°
20. When a beam of monochromatic radiation passes through a homogeneous absorbing medium, the rate of decrease of intensity of the radiation with thickness of absorbing medium is proportional to the intensity of the incident radiation. This law is:
 A. Beer's law
 B. Beer-Lambert's law
 C. Lambert's law
 D. Grotthus-Draper law

PART-B (5×16=80 Marks)

21. (a) (i) Explain reversible and irreversible cells with an example for each. (4+4=8)
 (ii) Describe a glass electrode and explain how it can be used for determining the pH of a solution. (8)

(OR)

21. (b) (i). State Kohlrausch's law and explain any two of its applications. (8)
(ii) Write notes on decomposition potential. (8)
22. (a) (i) The free energy change ΔG for a process is -138 kJ at 30°C and -135 kJ at 40°C . Calculate the change in enthalpy, ΔH accompanying the process at 35°C . (8)
(ii) Derive an expression for van't Hoff's isochore. (8)

(OR)

22. (b) (i) The equilibrium constant K_p for a reaction is 3.0 at 673 K and 4.0 at 773 K. Calculate the value of ΔH for the reaction. Given, $R=8.314 \text{ JK}^{-1}\text{mole}^{-1}$. (8)
(ii) Derive Gibb's-Helmholtz equation in terms of free energy and enthalpy changes at constant pressure. (8)
23. (a) (i) Derive an expression for the rate constant of a second order reaction when the initial concentration of the reactants are different. (8)
(ii) Write the applications of carbon nanotubes. (8)

(OR)

23. (b) (i) Derive an expression for the kinetics of opposing reaction, 1 order in both directions. (8)
(ii) Write the properties of carbon nanotubes. (8)
24. (a) (i). Derive Langmuir adsorption isotherm. What are its limitations? (6+2=8)
(ii) Explain the characteristics of catalysts. (8)

(OR)

24. (b) (i) Distinguish between physical adsorption and chemisorption. (8)
(ii) Derive Michaelis-Menten equation. (8)
25. (a) (i) Derive Beer-Lambert's law. What are its limitations? Outline its application. (3+2+3= 8)
(ii) Explain the principle and instrumentation of flame photometry with a neat block diagram. (8)

(OR)

25. (b) (i). Describe the estimation of the concentration of a substance by colorimetry. (8)
(ii) Write briefly the applications of IR spectroscopy in different fields. (8)
