

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov. - 2018

PHYSICAL AND ANALYTICAL CHEMISTRY (CORE)

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que-1 (A) State two criteria (characteristics) and two examples of spontaneous process. (04)
(B) Answer any two questions. (10)
(1) Discuss Carnot cycle and derive the equation for efficiency of heat engine.
(2) Derive the equations for change in entropy of ideal gas.
(3) 2 gm of solid is heated from 27° C to 37° C temperature. If the specific heat of the solid is 0.5 cal/gm, calculate change in the entropy of the solid.
- Que-2 (A) When 5 mole of ideal gas is reversibly and isothermally compressed at 127° C, its final volume, is half of the initial volume of the gas. Calculate change in free energy of the gas. ($R = 8.314 \text{ J K mol}^{-1}$) (04)
(B) Answer any two questions. (10)
(1) Derive van't Hoff reaction isotherm equation by equilibrium box method.
(2) Derive Clapeyron – Clausius equation.
(3) Discuss various types of two components partially miscible liquid pair.
- Que-3 (A) Explain the Weston standard cell with diagram. (04)
(B) Answer any two questions. (10)
(1) Describe various types of reversible electrodes.
(2) Explain spectrophotometric titration.
(3) The electrochemical cell is $\text{Pt/Sn}^{+2}, \text{Sn}^{+4} // \text{Fe}^{+2}, \text{Fe}^{+3} / \text{Pt}$. Write the cell reaction and calculate its equilibrium constant. $E^\circ (\text{Fe}^{+3}, \text{Fe}^{+2}) = 0.77 \text{ V}$ and $E^\circ (\text{Sn}^{+4}, \text{Sn}^{+2}) = 0.15 \text{ V}$.
- Que-4 (A) Define specific conductance and equivalent conductance and explain the relation between them. (04)
(B) Answer any two questions. (10)
(1) Explain the conductometric titrations of strong acid against strong base and mixture acid and weak acid against strong base.
(2) Describe various types of EDTA titration.
(3) The specific conductivity of saturated solution of AgCl is $1.12 \times 10^{-6} \text{ S cm}^{-1}$. The equivalent ionic conductivity of Ag^{+1} and Cl^{-1} ions is 54.3 and 65.5 $\text{S cm}^2 \text{equiv}^{-1}$, respectively, Calculate the solubility of AgCl in gm/lit (Molecular weight of AgCl is 143.5 gm/mole)
- Que-5 (A) Explain Ostwald's indicator principle. (04)
(B) Answer any two questions. (10)
(1) Discuss the titration curve of strong acid against strong base.
(2) Explain iodometry and iodimetry titrations.
(3) Describe Fajan's method to determine the end point of precipitation titration.
