

B.Sc. Semester - 5 (CBCS) Examination

Oct/Nov. – 2019

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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- Q. 1 (A) A Carnot engine operates between 227°C and 27°C by absorbing 1000 cal. from source. Calculate heat given to sink by the engine. (04)
- Q.1 (B) Answer any two questions. (10)
- (1) Explain the concept of entropy.
 - (2) Derive the equation for change of entropy of mixture of ideal gases and prove that it always increases when gases are mixed.
 - (3) If the temperature of 3 moles of ideal gas is increased from 27°C to 327°C, calculate the change in entropy of the gas at constant pressure and constant volume. [$C_p = (5/2) R$]
- Q. 2 (A) At 0°C and 1 atm. pressure specific volume of water and ice is 1.002 ml/gm and 1.0907 ml/gm, respectively. What will be the pressure to decrease the freezing point of water 1°C? Latent heat of ice is 79.7 cal/gm (1 cal=41.29 ml atm.) (04)
- Q. 2 (B) Answer any two questions. (10)
- (1) Explain the physical significance of work function and free energy.
 - (2) Derive Van't Hoff equation and explain the calculation of change of enthalpy by graph.
 - (3) Discuss phase diagram of formation of one pair of partially miscible liquid of three component liquid system.
- Q. 3 (A) Explain the instrument of colourimeter with diagram (04)
- Q. 3 (B) Answer any two questions. (10)
- (1) Discuss reversible and irreversible cell.
 - (2) State the properties of the standard cell and describe Weston standard cell.
 - (3) Explain any two secondary reference electrodes.
- Q.4 (A) 2.08 gm BaCl_2 was dissolved in 1 lit solution. If the specific conductance of the solution is 0.0062 S cm^{-1} , calculate molar and equivalent conductance of the solution. (04)
- (Molecular Wt. of BaCl_2 is 208 gm/mole)
- Q. 4 (B) Answer any two questions. (10)
- (1) State the general properties of metal ion indicators and explain its principle.
 - (2) Describe various types of displacement titration.
 - (3) Explain the measurement of degree of hydrolysis and hydrolysis constant by conductometry.
- Q. 5 (A) Explain the titration curves of titration of polyprotic acid against strong base. (04)
- Q. 5 (B) Answer any two questions. (10)
- (1) Discuss primary and secondary standard of volumetric analysis.
 - (2) Describe the indicators of redox titrations.
 - (3) Describe Mohr method to determine the end point of precipitation titrations.