

THAPAR INSTITUTE OF ENGINEERING AND TECHNOLOGY, PATIALA

B.E. 1st year, Chemistry CB-101; END-SEMESTER Exam; 7th Dec., 06

Time : 3hrs

Max. Marks : 45

Write your GROUP No. at the top of the answer sheet

Attempt any five question (page 1 & 2)

1. (i) Drive an equation for the emf of the following cell with transference. Calculate the emf for the same, if the transference number of H^+ is 0.83. (4)



(ii) What are the advantages of conductometric titration over volumetric titration? Draw well labeled conductometric titration curves for the following and explain the shapes of (a) Strong acid with strong base (b) Strong acid with weak base (c) Weak acid with strong base (4)

(iii) What relationship exists between Δ_0 and pairing energy (P) in determining whether a given complex will be high or low spin? (1)

2. (i) Draw electronic arrangements and calculate CFSE (Δ_0) and spin only magnetic moments in case of weak and strong ligand field for d^5 and d^6 system. (4)

(ii) Differentiate the principle of atomic absorption and flame emission spectroscopy (2)

(iii) Write the principle of hollow cathode lamp (1)

(iv) Among TiO_2 and $[Ti(H_2O)_6]^{+3}$ which is colorless and why? (1)

(v) Tetrahedral complexes are always high spin, why? (1)

3. (i) Define and drive Beer-Lambert Law and write its four limitations. (4)

(ii) The quantum yield of CO in the laser pulse photolysis of native CO-bound heme protein at 550nm was found 0.5. Calculate the number of moles of CO formed when the sample is irradiated with 50 watt of this radiation by assuming that all the radiation is absorbed by the sample. (3)

(iii) Draw a well-labeled diagram for the water system and explain the effect of pressure on the melting point of ice. (2)

4. (i) Write short notes on (5x1)

(a) Chromophores (b) Auxochromes (c) Blue shift (d) Red shift (e) Hyperchromic effect

(ii) Discuss asymmetry and electrophoretic effect in Debye Huckel theory of strong electrolytes. (2)

(iii) Explain the variation of molar and specific conductance with dilution for strong and weak electrolytes. (2)

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5. (i) Discuss the effect of unstauration at alpha (vinylic) and beta carbon (allylic) in alkyl-halides towards nucleophilic substitution reactions by taking suitable examples. (2)
- (ii) Draw well labeled energy diagram for SN^1 and SN^2 reactions in case of alkyl-halides. (2)
- (iii) Explain E_2 and E_1CB reaction mechanism with suitable examples. (2)
- (iv) Differentiate the following: (3 x 1)
- (a) Replication and transcription
 - (b) RNA and DNA
 - (c) mRNA and tRNA
6. (i) Draw fisher projection of syndiotactic and isotactic forms of the polymer formed by monosubstituted-ethylene. (9 x 1)
- (ii) Generally the change in volume during conductometric titration should be as small as possible, why?
- (iii) Which material should be used for making cuvettes in UV spectroscopy and why?
- (iv) Why the ionic mobility of H^+ ion is more than the other ions in aqueous solutions?
- (v) An alloy of tin and lead contain 73% tin. Find the mass of eutectic in 1 kg of solid alloy, if the eutectic contains 64% of tin.
- (vi) Differentiate nucleotide from nucleoside.
- (vii) Why more stability of carbonium ion leads to more racemization in case of SN^1 reactions?
- (viii) Why nucleophile is more active in polar aprotic solvents than in polar protic solvents?
- (ix) Explain λ_{max}