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BSCCHC 253

**Credit Based Fourth Semester B.Sc. Degree Examination, April/May 2017
(2015-16 Batch Onwards)
Paper – IV : CHEMISTRY**

Time : 3 Hours

Max. Marks : 80

- Instructions :** 1) Write the question number and sub division **clearly**.
2) Write equation and diagram **wherever** necessary.
3) Answer Part – A in the first **two** pages of the answer book.
4) Scientific calculators are **allowed**.

PART – A

1. Answer **any ten** of the following :

(2×10=20)

- Write the IUPAC names of
 - $K_2[Ni(CN)_4]$ and
 - $[Co(H_2O)_2(NH_3)_4]SO_4$
- What are ambidentate ligands ? Give an example.
- Calculate the spin only magnetic moment of low spin complex of Fe^{+3} system.
- State Le Chatelier's principle.
- Write two ideal conditions to satisfy the good freezing mixture.
- Finely powdered solid substance is an effective adsorbent. Give reason.
- State Charle's-Van't Hoff law.
- Write Clausius-Mosotti equation and explain the terms.
 - Define the term reverse osmosis. Write its one application.
 - How do you convert ethylacetoacetate into antipyrine ? Give equation.
 - Toluene can be nitrated more easily than benzene. Give reason.
- State Saytzeff rule with suitable illustration.

P.T.O.



PART – B

Answer **any four** questions. Choosing **one** question from **each** Unit. (15×4=60)

Unit – I

2. a) What are ionisation and linkage isomerisms ? Give one example each. 4
- b) On the basis of valence bond theory explain the hybridisation, geometrical shape and magnetic properties of $[\text{Ni}(\text{Co})_4]$. 4
- c) i) Explain any four factors that affect the crystal field splitting energy. 4
- ii) Write all possible geometrical isomers for $[\text{Co}(\text{en})_2\text{Cl}_2]^+$. 3
3. a) Write any three differences between Valence bond theory and Crystal field theory. 3
- b) Describe the crystal field splitting of “d” orbital in tetrahedral complexes. 5
- c) i) Explain optical isomerism in complexes with co-ordination number four. 4
- ii) Write a short note on spectro chemical series. 3

Unit – II

4. a) Thermodynamically derive law of mass action. 4
- b) Explain the phase diagram of water system. 4
- c) i) Write BET equation. How can it be used to determine the surface area of an adsorbent ? 4
- ii) Calculate the standard free energy change for the reaction with Kp value equal to 1×10^{-5} at 298 K. ($R = 8.314\text{J/K/mol}$). 3
5. a) Write any three applications of Clapeyron-Clausius equation. 3
- b) Discuss the phase diagram of magnesium-zinc system. 5
- c) i) Derive Van't-Hoff equation. 4
- ii) Write the mathematical expression for Langmuir adsorption isotherm. Explain the behaviour of this isotherm at very low and very high pressures. 3



Unit – III

6. a) Derive thermodynamic relationship between boiling point elevation and molecular mass of the solute. **4**
- b) Describe how dipole moment is measured by temperature method. **4**
- c) i) Explain the measurement of relative lowering of vapour pressure by Ostwald and Walker dynamic method. **4**
- ii) Write any three applications of refractometry. **3**
7. a) Explain the term Induced polarisation and orientation polarisation. **3**
- b) Describe the determination of molecular mass of a solute by Walker-Lumsden method. **5**
- c) i) Explain the working of Abbe's refractometer. **4**
- ii) Calculate the osmotic pressure of 5% solution of sucrose at 298K [R = 8.314 J/K/mol]. **3**

Unit – IV

8. a) How the following synthesized from active methylene compounds ?
- i) Crotonic acid
- ii) Succinic acid, **4**
- b) Explain the mechanism of sulphonation of benzene. **4**
- c) i) Describe any two factors which influence the rate of S_N2 reaction. **4**
- ii) Write a short note on orth/para ratio. **3**
9. a) Explain the mechanism of E_1 reaction. **3**
- b) Describe Keto-enol tautomerism in ethyl acetoacetate. Write the supporting evidences in each case. **5**
- c) i) What is orienting influence of substituents ? Explain the orienting influence of meta directing substituents with a suitable example. **4**
- ii) Give the mechanism of conversion of bromo benzene to aniline. **3**