**CHEMISTRY P-I S.Y.B.Sc ATKT SEM-III MARKS 100 TIME 3 HRS**

**NOTE: i) All the questions are compulsory.**

**ii) Figures to the right indicates full marks.**

**iii) Use of non-programmable calculator/ log table is allowed.**

**Q.1 A) Multiple choice Questions.** **(12M)**

1. Gibb's free energy is.....

   a) Extensive property b) Intensive Property c) constitutive property

2. If $\Delta G$ has negative value, then the reaction is .....

   a) Non-spontaneous b) Spontaneous c) at equilibrium

3. Sum of transport number of cations and anions of an electrolyte is .....

   a) 1 b) zero c) Less than one

4. Which of the following factors affects electrolytic conductance.....

   a) Nature of solute b) Inerionic interaction c) Both

5. For tetrahedral geometry the radius ratio rule is .....

   a) 0.155-0.225 b) 0.225 – 0.414 c) 0.414 – 0.732

6. Hybridization of 'Be' in $BeF_2$ is.....

   a) Sp b) $sp^2$ c) $sp^3$

7. Number of resonating structures of CO molecule will be .....

   a) 2 b) 3 c) 4

8. If an electron is removed from an antibonding molecular orbital of the species, the bond order.....

   a) Decreases b) increases c) remains the same

9. Phenols can be prepared by.....

   a) Dow's process b) Naphthalene sulphonic acid c) both

10. Epoxides are named as.....

    a) Oxitanes b) Oxiranes c) Oxaphosphetanes

**11.** An appropriate solvent for Grignard's reagent formation is .....

a) Tetrahydrofuran b) water c) aqueous alcohol

**12.** Reaction of Epoxide with HX leads to the formation of .....

a) Halohydrin b) alkyl halide c) alcohol

**B) Match the following.** **(05M)**

| | |
|---|---|
| i) Fugacity | a) Octahedral structure |
| ii) Cell constant | b) Lattice energy |
| iii) Born Lande's equation | c) $\mu = \mu^0 + RT \ln f$ |
| iv) Sulphur hexa fluoride | d) Detergents |
| v) Sulphation of alcohols | e) l/a |

**C) State whether the following statements are True or False.** **(03M)**

1) For strong electrolytes degree of dissociation is nearly equal to one.

2) Bond order in $O_2$ molecule is 2.

3) $SN^1$ reactions are favored by less polar solvents.

**Q.2 Attempt ANY FOUR of the following questions.** **(20M)**

1) Derive Gibb's –Duhem equation.

2) State and explain Kohlraush's law of independent migration of ions.

3) The standard free energy change for a gaseous reaction is 71.128 KJ. Calculate the equilibrium constant of reaction at 2000K (Given, R = 8.314 Jk-1mol-1).

4) Derive Van't Hoff reaction isotherm.

5) Explain how ionization constant of weak electrolyte is determined by conductance method.

6) 0.5 N solution of a salt occupying a volume between two platinum electrodes 1.72 cm apart of area 4.5 $cm^2$ has a conductance of 0.04Sohms. Calculate the equivalent conductivity of the solution.

**Q.3 Attempt ANY FOUR of the following questions.** **(20M)**

1) What are the conditions for the formation of covalent bond.

2) Explain any five conditions for resonance.

3) On the basis of molecular orbital theory explain magnetic property and bond order of oxygen molecule.

4) Calculate the lattice energy of NaCl crystal from the following data by the use of Born-Haber Cycle. Heat of atomization of Sodium = 108.7 KJmol-1, . Heat of atomization of chlorine = 120.9 $KJmol^{-1}$, Ionisation potential of sodium = 493.7 $KJmol^{-1}$, Electron affinity of chlorine(Cl)= -365.3 $KJmol^{-1}$, Heat of formation of NaCl = -410.9 $KJmol^{-1}$.

5) Give postulates of valence bond theory.

6) Give difference between bonding and antibonding molecular orbitals.

**Q.4 Attempt ANY FOUR of the following questions.** **(20M)**

1) With respect to the preparation of alcohols, explain the following reactions.

   a) Sulphatation b) Eyherification

2) Write a note on claisen rearrangement of allyloxy arenes.

3) Explain SN1 reaction with mechanism .

4) Explain the mechanism of alkaline hydrolysis of tert- butyl bromide giving energyprofile diagram.

5) What are Grignard's reagent? How are they prepared? What is the function of ether/THF.

6) Give applications of phenols.

**Q.5 Attempt ANY FOUR of the following questions.** **(20M)**

1) Discuss the factors affecting transport number.

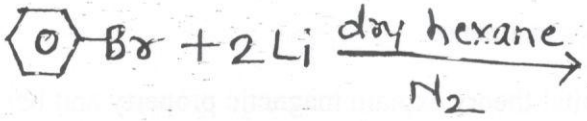
2) If the equivalent conductance of Dichloroacetic acid at infinite dilution at $25^0C$ is 388.5 $Scm^2$ and the degree of ionization 0.61. Estimate the specific conductivity of 0.1 N dichlor oacetic acid.

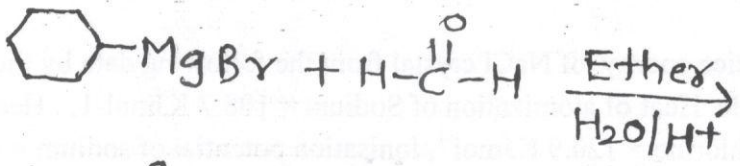
3) Give applications of Born-Haber cycles

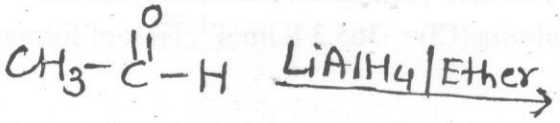
4) Define Hybridization. Explain the hybridization of Be in $BeCl_2$.

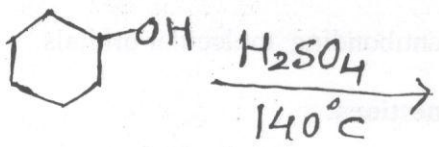
5) Complete the following reactions.

i) $CH_3CH_2-CH_2CH_2-Cl + 2Li \xrightarrow[N_2]{\text{dry hexane}}$

ii) 

iii) 

iv) 

v) 

6) Give the ring opening reactions of Epoxides by:

i) Hydrolysis in acidic conditions

ii) Reaction with HX

iii) Reaction with ROH

iv) Reaction with HCN

v) Reaction with RMgX