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

15/10/19

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 ΔG 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 –Helmholtz equation.
2) Derive Van't Hoff's reaction isotherm.
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) Explain the factors affecting electrolyte conduction.
5) Explain how degree of ionization is determined by conductance method.
6) 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.

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

1) What is ionic bond? Explain any two conditions for the formation of ionic 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) Give applications of Born-Haber cycles
5) Give postulates of valence bond theory.
6) Give difference between sigma and pi molecular orbitals.

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

1) Write a note on claisen rearrangement of allyloxy arenes.
2) With respect to the preparation of alcohols, explain the following reactions.
   a) Sulphatation b) Eyherification
3) Explain the mechanism of alkaline hydrolysis of tert- butyl bromide giving energyprofile diagram.
4) Explain SN^1 reaction with mechanism .
5) 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
6) Give applications of phenols.

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

1) Discuss the factors affecting transport number.

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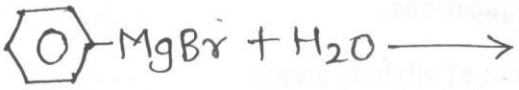
2) 22.6 g of an aqueous solution of ethanol contains 4.6 g of ethanol. If change of chemical potential of ethanol is -10 KJ. Find the change of chemical potential for H_2O.

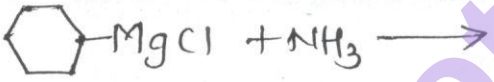
3) Calculate the lattice energy of NaCl crystal from the following data by the use of Born-Haber Cycle. Heat of atomization of Sodium = 108.7 KJmol-1, . Heat of atomization of chlorine = 120.9 $KJmol^{-1}$, Ionisation potential of sodium = 493.7 $KJmol^{-1}$, Electron affinity of chlorine(Cl)= -365.3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

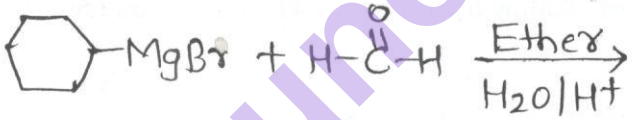
4) Define Hybridization. Explain the hybridization of Be in $BeCl_2$.

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

6) Complete the following reactions.

i) 

ii) 

iii) 

iv) $C_2H_5MgCl + \bigcirc\!\!=O \xrightarrow[H_2O/H^+]{Ether}$

v) $C_6H_5MgCl \xrightarrow[H_2O/H^+]{CO_2,\ dry\ ice}$

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