MCHT 2.1

II Semester M.Sc Degree Examination, Feb 2015

CHEMISTRY

Inorganic Chemistry-II

Time: 3Hours Max. Marks: 80

PART-I

1. *Answer any eight questions* (2 x 8 = 16)

i) Write any four general characteristics of lanthanides.

ii) How uraniumhydride is obtained? Mention its two uses.

iii) "NO^+ is three electron donor while NO^- is one electron donar" justify the statement.

iv) Write the structural formula for the potassium hexafluoroantimonate(V) complex. Predict its magnetic behavior.

v) Give one example each for co-ordination compounds showing linkage and ionization isomerism.

vi) Depict the bonding modes of metal nitrosyl compounds.

vii) What is thermodynamic and kinetic stability of complexes?

viii) What are outer orbital complexes? Give two examples.

ix) What is spectrochemical series?

x) Mention the conditions and criteria for combining atomic orbitals.

PART-II

Answer any four questions

2. a) Discuss the chemical properties of hydroxide, halides and hydrides of lanthanides.

b) Explain the spectral and magnetic properties of actinides.

c) What are dioxygen complexes? Discuss the different bonding modes and spectroscopic characteristics of these compounds. (4 + 6 + 6 = 16)

3. d) With suitable example illustrate homoleptic and heteroleptic complexes.

e) Explain the size and solubility relationships in synthesis of co-ordination compounds.

f) Illustrate with example ligand isomerism, likage isomerism and ionization isomerism.

(4 + 6 + 6 = 16)

4. g) Discuss the factor affecting the stability of complexes.

h) Draw the crystal field energy diagram of $[Cu(Cl)_6]^{4-}$ complex ion and predict its magnetic behaviour.

i) List out similarities and differences in VBT nad CFT. (4 + 6 + 6 = 16)

5. j) Explain the π-bonding in tetrahedral transition metal complexes according to MOT.

k) Depict the molecular orbital diagram for $[Fe(CN)_6]^{3-}$.Explain its salient features.

l) In what way are Tanabe-Sufano diagrams different from Orgel diagrams? Draw Orgel diagram for an octahedral Cr(III) complex. (4 + 6 + 6 = 16)

6. m) Discuss the structure and bonding in isocyanide complexes.

n) What is Tolman electronic parameter and Tolman cone angle?

o) Write the IUPAC name and structure of the following co-ordination compounds.

$[Co(en)_2Br_2]Cl$, $K[BF_4]$, $Na_2[MoCl_6]$ (4 + 6 + 6 = 16)

7. p) What is EAN? How the stability of the complex is interpreting using this rule? Illustrate with examples.

q) Predict the number of unpaired electron in the following complex and classify them as low or high spin. $[Co(NH_3)_6]^{3+}$, and $[Cr(H_2O)_6]^{3+}$

r) Discuss the relationship between π-ability of ligand and spectrochemical series.

(4 + 6 + 6 = 16)

MCHT 2.2

II Semester M.Sc Degree Examination, Feb 2015

CHEMISTRY

Organic Chemistry-II

Time: 3 Hours Max. Marks: 80

PART-I

1. *Answer any eight questions* 2 x 8= 16

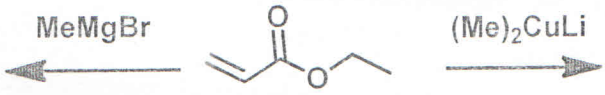
i) What are synthons? Give one example.

ii) Discuss the use of LDA in organic synthesis.

iii) Write any two major use of NBS reagent.

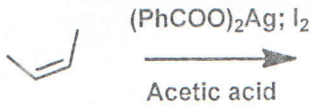
iv) What one reaction of leadteraacetate $Pb(OAc)_4$ in organic synthesis.

v) Write the structure of products in the following reaction.



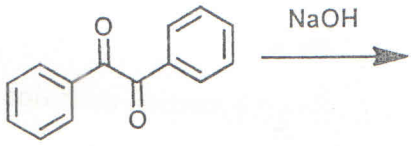
vi) Write two applications of Wilkinson catalyst.

vii) Write the structure of the product in the following reaction.



viii) What is favorski rearrangement?

ix) Write the product for the following.



x) Write an example for steroselective and stereo specific reaction.

PART – II

Answer any four questions

2. a) Discuss the use Girgnard reagents in organic synthesis.

b) With two examples explain the mechanism of phase transfer catalyst in organic reaction.

c) With examples discuss any three uses of organoruthenium compounds.

(6 + 6 + 4 = 16)

3. d) What are the reagents used for dihydroxylation reaction? Explain the mechanism of reaction for any one reagent.

e) Discuss the functional group transformation achieved using selenium dioxide (SeO_2) reagent.

f) With suitable examples illustrate the advantage and disadvantage of LAH and $NaBH_4$ reducing agents.

(4 + 6 + 6 = 16)

4. g) What is Pinacol-pinacolone rearrangement? With an example explain the mechanism.

h) What is Schmidt rearrangement? Discuss the mechanism of the rearrangement.

i) Illustrate the mechanism of Michael addition with example.

(4 + 6 + 6 = 16)

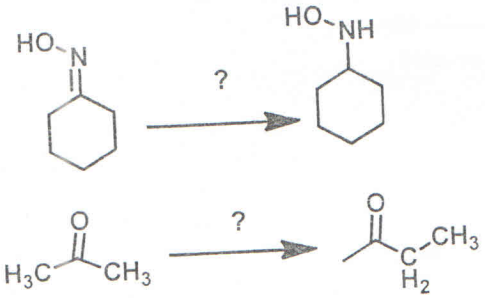
5. j) Discuss chiral auxiliary and explain the essential conditions for good chiral auxiliary?

k) Write a note on stark enamine synthesis.

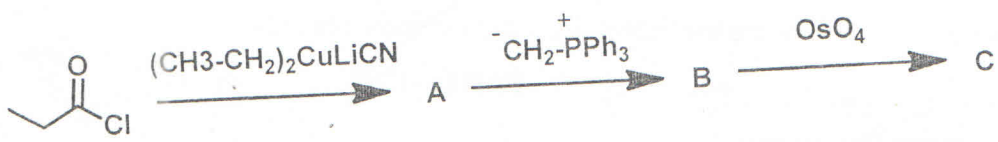
l) Write any three reagents used for protecting –OH groups in organic synthesis and mention their deprotection conditions.

(6 + 4 + 6 = 16)

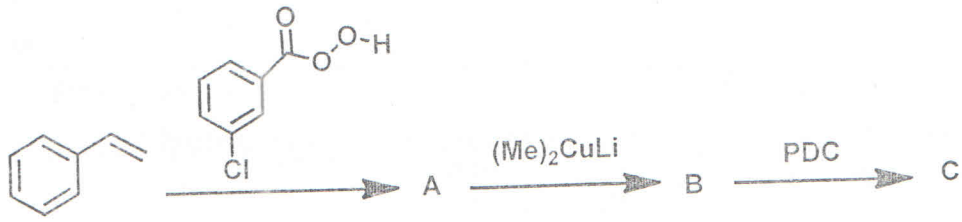
6. m) Mention the suitable reagent used for following transformation



n) Predict the structure of products for the following reaction conditions.



o) Write the structure of the product for the following reaction sequence.



(4 + 6 + 6 = 16)

7. p) What is Fries rearrangement? Write its mechanism.

   q) What is Perkin condensation? Discuss the mechanism.

   r) Discuss orthogonal protection strategy with suitable example.

(4 + 6 + 6 = 16)

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II Semester M.Sc Degree Examination, Feb 2015

CHEMISTRY

Physical Chemistry-II

Time: 3Hours Max. Marks: 80

PART-I

*Answer **any eight** questions* (2 x 8 = 16)

i) Explain electromossis principle

ii) Define activity co-efficient and write the relation to relate activity and activity coefficient.

iii) What is eutectic temperature?

iv) Explain the Faraday's Laws of electrolyte.

v) If transport number of Na^+ is 0.6 calculate the transport number of Cl^- in NaCl.

vi) What is electrophoric effect?

vii) What s Liquid junction potential?

viii) Distinguish between adsorption and absorption.

ix) What is the difference between sol and emulsion?

x) State Le chatelier's principle?

PART-II

*Answer **any four** questions*

2. a) Derive the expression for the relationship between Osmostic pressure and vapor pressure.

b) Describe the determination of activity co-efficient by conducting method.

c) Discuss the application of the phase rule for sulphur system. (4 + 6 + 6 = 16)

3. d) Write a note on electrophoretic effect.

e) Derive the expression for the Debye-Huckel theory of activity co-efficient.

f) Discuss the different models of electrical double layers. (4 + 6 + 6 = 16)

4. g) Discuss the application of Schrödinger for particle in a three dimensional box.

h) Discuss the physical significance of S orbital.

i) Explain the application of perturbation methods to He atom. (4 + 6 + 6 = 16)

5. j) Discuss the Langmuir adsorption isotherm for uni molecular surface reaction.

k) What is adsorption isotherm? Explain Gibb's adsorption isotherm.

l) What are Lyophilic and Lyophobic sols? Give one example each. Why lyophobic sols easily co-agulated? **(4 + 6 + 6 = 16)**

6. m) Derive the expression for the enthalpy of mixing of Ideal solution.

n) Discuss the application of zone electrophoresis.

o) Describe the determination of isoelectric point by electrical methods. **(6 + 6 + 4 = 16)**

7. p) Write a note on abnormal transport numbers.

q) Explain the application of variation theorem for particle in one dimensional box.

r) Discuss the effect of pressure and temperature on the adsorption of gases on solids.

(4 + 6 + 6 = 16)

MCHT 2.4

II Semester M.Sc Degree Examination, Feb 2015

CHEMISTRY

Analytical Chemistry-II

Time: 3Hours

Max. Marks: 80

PART-I

1. *Answer any eight questions* (2 x 8 = 16)

i) Distinguish between determinate and indeterminate errors.

ii) Mention the different methods of expressing precision.

iii) What is a chemical indicator? Write any two indicators used in acid-base titrations.

iv) What is Karl-Fischer reagent? How is it standardized?

v) Bring out the difference between stepwise and overall formation constant of complexes.

vi) Why erichrome back-T is called a metallochromic indicator? Write its action in the titration of Zn(II) with EDTA.

vii) Give the meaning of the terms: distribution ratio and distribution co-efficient

viii) What is chromatography? How is planar chromatography different from column chromatography?

ix) What are the stationary phases and mobile phases used in HPLC?

x) Name the different electrochemical techniques used in analytical chemistry?

PART-II

Answer any four questions

2. a) Discuss the various approaches available for minimizing methodic systematic errors.

b) What are the differences between post precipitation and co precipitation? Write briefly on precipitation from homogeneous solution (PFHS).

c) Discuss the theory of acid-base indicators. Write the indicator action of phenolphthalein in the titration of acetic acid with sodium hydroxide. (4 + 6 + 6 = 16)

3. d) What are redox titrations? Illustrate the applications of permanganate as an oxidometric titrant.

e) Compare Mohr and Volhard methods with respect to principle, methodology and advantages and limitations.

f) Describe the use of radioisotopes in solving analytical and physico- chemical problems.

(4 + 6 + 6 = 16)

4. g) Why are EDTA titrations not selective? How is their selectivity improved?.

h) Write the structure of EDTA and its acidic properties. Explain the various types of titrations employing EDTA as titrant.

i) What are leveling and differentiating solvents? Discuss the principles of titration of week bases and week acids in non-aqueous medium. (4 + 6 + 6 = 16)

5. j) What is batch extraction? Discuss the advantages of multiple extractions over single extraction.

k) Explain the general theory of column chromatography? Write a note on chromatographic resolution.

l) Write the schematic of a modern gas chromatograph and label the components. Write an account of stationary phases used in GC . (4 + 6 + 6 = 16)

6. m) Give an account of titration of polyprotic acids and poly equivalent bases.

n) Describe the process of formation of a gravimetric precipitate.

o) Discuss the principles of activation analysis and isotope dilution analysis.

(4 + 6 + 6 = 16)

7. p) Write the principles of size exclusion chromatography. Illustrate its applications.

q) Discuss the principles and applications of coulometric titrations. Mention its advantages over conventional titrations.

r) What are ion selective electrodes? Discuss the construction and working of glass electrode for pH measurement. Mention the types of errosr encountered in using the glass electrode for pH measurement. (4 + 6 + 6 = 16)