MCHE H 402

REG.NO.....

CHOICE BASED CREDIT SYSTEM FOURTH SEMESTER M.Sc. DEGREE EXAMINATION APRIL 2019

M.Sc. CHEMISTRY

SYNTHETIC METHODS IN ORGANIC CHEMISTRY

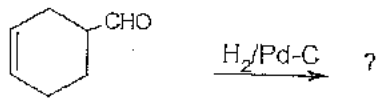
Time: 3 Hrs

Max. Marks: 70

PART - A

I Answer any TEN of the following (2×10=20)

a) How is DDQ helpful in aromatization reactions?
b) Give an account of application of crown ethers as phase transfer catalysts.
c) Illustrate the use of trimethyl silyl reagent in organic synthesis.
d) Write the synthetic applications of N-bromosuccinimide.
e) Compare the reactivity of substituted per acids for the epoxidation of alkenes.
f) How is Jones reagent prepared? Write its synthetic advantages.
g) Write the utility and the selectivity of Wolf-Kishner reduction reactions.
h) Predict the product in the following:



i) Differentiate hydrolysis from hydrogenolysis reaction taking an example in each case.
j) Explain the following terms using suitable examples; Synthon & synthetic equivalent.
k) Write the retroanalysis of benzocaine.
l) Explain the use of benzyl group as a protecting group in organic synthesis. Mention two of its limitations.

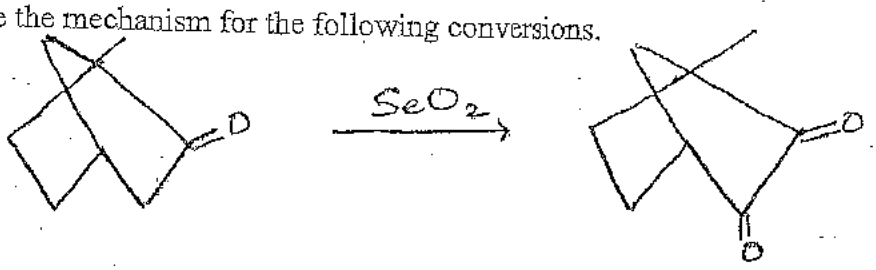
PART B

Answer any FIVE questions selecting any ONE question from each unit. **(10×5=50)**

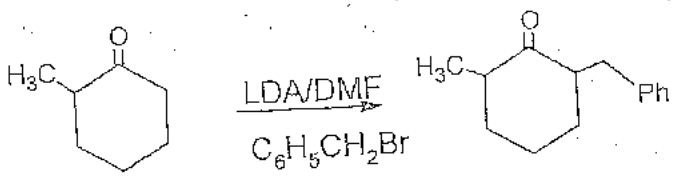
UNIT - I

2) a) Explain the synthetic use of Gilman reagent in organic synthesis.
b) Describe the synthetic applications of DCC. (5+5)

3) a) Write the mechanism for the following conversions.
i)



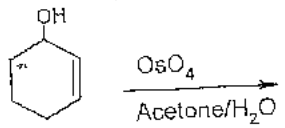
PART B

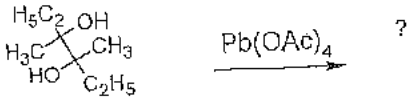
ii) 

b) Give an account of Baker's yeast catalyzed organic transformations. (5+5)

UNIT - II

4) a) Propose a suitable mechanism for the oxidation of cyclohexanol using acidic $K_2Cr_2O_7$.
b) Predict the product and propose the mechanism for the following:

i) 

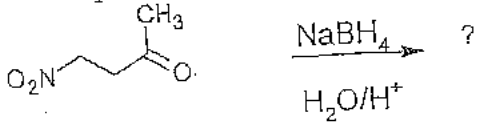
ii) 

(5+

5) a) Write the mechanism of addition of bromine to symmetrical and unsymmetrical alkenes. Comment on the major products formed.
b) How do you achieve the cis-hydroxylation of alkenes using $KMnO_4$? Explain with mechanism. (5

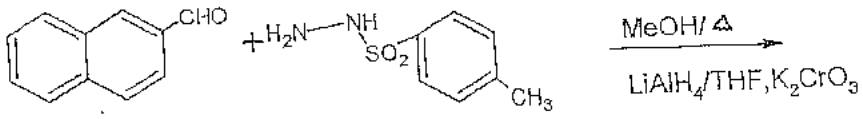
UNIT - III

6) a) How is LAH prepared? Describe the mechanism of reduction of carbonyl compounds u LAH.
b) i) What do you mean by homogeneous catalytic hydrogenation? Write its mechanism an illustrative example.
ii) Predict the product and propose the mechanism for the following:



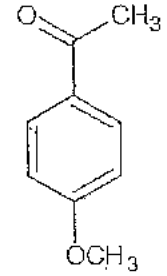
(4

7) a) Write a note on Birch reduction.
b) Predict the products in the following outlining its mechanism:



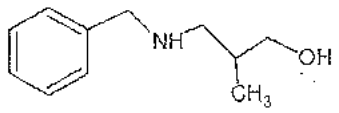
(4+

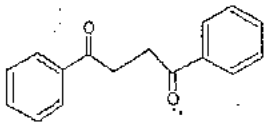
8) a) What is chemoselectivity? Suggest a synthetic scheme for Juvabione.
b) What is 1, 2-diX relationship? Explain the retrosynthetic strategy for



(5+5)

9) a) Perform retrosynthetic analysis of the following molecules by taking atleast two synthetic options.

i) 

ii) 

b) Illustrate the C-X disconnection approach for the synthesis of 1,3- difunctionalized compounds. (6+4)

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MCHE H 403

REG.NO.....

OICE BASED CREDIT SYSTEM FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2019

M.Sc: CHEMISTRY

PHYSICAL CHEMISTRY THEORY III

Time: 3 Hrs

Max. Marks: 70

PART - A

I Answer any TEN of the following **(2×10=20)**

a) Write the relation between activity; mean molal activity coefficient & molality for uni-univalent and uni-bivalent electrolyte.
b) State Walden's rule.
c) Validate qualitatively & quantitatively Debye Huckel limiting law.
d) Mention the significance of Mott-Schottky plot.
e) What is Donnan membrane equilibrium?
f) Give one advantage & disadvantage of photogalvanic cells.
g) Draw the electrocapillary curve. How is the charge density on the electrode obtained from this curve?
h) Give the expression for the total capacity of the electric interface in Stern model.
i) Write the half cell reactions occurring in nickel cadmium cell.
j) Mention any two factors affecting over voltage.
k) Predict the reason for change in the rate of corrosion in poorly coated metal.
l) What is exchange current density?

PART B

Answer any FIVE questions selecting any ONE question from each unit **(10×5=50)**

UNIT - I

2) a) Explain the discharge of ions on electrolysis using Hittorf's theoretical device.
b) A solution of silver nitrate was electrolysed between silver electrodes. Before electrolysis, 10g of the solution contained 0.01788 g of silver nitrate. After the experiment, 20.09g of the anodic solution contained 0.06227g of silver nitrate. At the same time, 0.009479g of copper was deposited in the copper coulometer placed in series. Calculate the transport number of silver & nitrate ions. (Ag=108, Cu=63.6)
(6+4)

3) a) Define the terms electro osmosis, electro-phoresis & zeta potential.
b) Explain the conductivity of dilute solutions using the concept of ionic atmosphere.
(6+4)

PART B

UNIT - II

4) a) Outline the mechanism of electrocatalysis of the evolution of oxygen from alkaline solution of perovskites.
   b) Derive Nernst Planck equation for transport of ions across the membranes. (6+4)

5) a) Explain the effect of light at interface of semiconductor.
   b) Derive an expression for Liquid Junction Potential of a concentration cell with transference. Mention the effect of transference number on Liquid Junction Potential. (6+4)

UNIT - III

6) a) Write a comparative note on the characteristic features of the various models of double layer.
   b) Describe the construction & working of a H_2-O_2 fuel cell. Mention its applications. (6+4)

7) a) Discuss the working of dropping mercury electrode for polarographic measurements. What are the advantages of using dropping mercury electrode?
   b) Illustrate amperometric titration with suitable examples. (6+4)

UNIT - IV

8) a) Account for the following
   i) Iron bolts in copper vessel are underisable
   ii) Part of the nail inside the frame undergoes corrosion but, the exposed part does not
   iii) Stainles steel steam boilers undergoes caustic embrittlement.
   b) The half cell reaction of rusting of iron are
   $2H^+ + \frac{1}{2}O_2 + 2e^- \rightarrow H_2O \quad E^\circ = +1.23V$
   $Fe^{2+} + 2e^- \rightarrow Fe \quad E^\circ = -0.44V$
   Calculate ΔG kJ/mol for overall reaction. (6+4)

9) a) Describe the importance of Butter-Volmer and Tafel equations in the study of corrosion rates.
   b) Write a note on corrosion inhibition. (6+4)

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MCHE S 404

REG.NO.....

CHOICE BASED CREDIT SYSTEM FOURTH SEMESTER M.Sc. DEGREE EXAMINATION APRIL 2019

M.Sc. CHEMISTRY

POLYMER AND SOLID STATE CHEMISTRY

Time: 3 Hrs

Max. Marks: 70

PART - I

I Answer any TEN of the following **(2×10=20)**

a) Write the principle of sedimentation equilibrium method of determining molecular weight of polymer.

b) A polymer sample containing 400 molecular of molecular weight 1 x 10^4 g/mol and 200 molecules of molecular weight 1 x 10^5 g/mol has the polydispersity index of 6.0. Calculate the $\bar{M}_w$ of the sample.

c) Classify polymers based on structure with suitable examples.

d) Mention four differences between addition polymerisation and condensation polymerisation.

e) Write the structure and two applications of Teflon and PMMA.

f) What is living polymer? Suggest a termination step.

g) Compare the effect of temperature on the conductivity of a metal, semiconductor and an insulator.

h) Define the terms work function and Fermi energy.

i) Mention any two properties of dielectric materials.

j) What is Kirkendall effect?

k) Highlight on the conditions required for electroless deposition of thin films on a substrate.

l) Give the principle of XRF

PART II

Answer any FIVE questions selecting any ONE question from each unit. **(10×5=50)**

UNIT - I

2) a) Discuss the importance of polymers and classify them based on origin and interparticle forces.
b) Describe the membrane osmometric method of determination of molecular weight of polymers.
c) Elaborate on fractional precipitation technique of determining molecular weight of polymers. (3+3+4)

3) a) Explain how the molecular weight of polymers is determinal by light scattering method.
b) Elucidate the use of GPC in polymer fractionation and molecular weight determination. (5+5)

UNIT - II

4) a) Discuss the mechanism of cationic polymerisation.
b) Write a note on reactivity ratio and copolymer types. (5+5)

PART B

5) a) Contarst on kinctics of copolymerization and obtain the co-polymer equation.
   b) Explain the synthesis and application of Nylon, Polyethylene and polypropylene. (4+6)

UNIT - III

6) a) Explain band theory of solids. Classify the materials into metals, semiconductors and insulators on the basis of this theory.
   b) Discuss organic superconductors and mention its applications.
   c) Mention the importance of glass transition temperature of amorphous materials and discuss th factors influencing it. (3+3+4)

7) a) Explain any two applications of piezo electric materials
   b) Explain the band structure of p-n junction.
   c) Write a short note on
      i) perovskites ii) Type 1 super conductors. (3+3+4)

UNIT - IV

8) a) Describe Wagner's theory of solid state reactions.
   b) Contarst on principle of XPS and AES.
   c) Elucidate structure of gaseous molecules by electron diffraction techniques. (4+3+3

9) a) Outline the growth of single crystals by Czochralski and Verneuil flame fusion methods.
   b) Illustrate preparation of thin films by physical methods.
   c) Sketch the instrumentation and briefly explain the working of single crystal X-ray diffraction. (4+3+3)

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