

22MCHEH201

Reg No :

CHOICE BASED CREDIT SYSTEM

M.Sc. CHEMISTRY SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Inorganic Chemistry -II

Duration:3 Hours

Max Marks:70

PART - A

1. Answer any TEN of the following :

(2×10= 20)

- a) Give two examples for isopoly acids.
- b) Classify the following based on Wade's rule.
i) B_6H_{10} ii) B_4H_{10}
- c) Give the STYX number of $B_{10}H_{14}$.
- d) XeF_6 is cannot be stored in glass or quartz vessels. Justify by indicating reaction.
- e) How would you account for the following order in the acid strengths of the oxoacids of halogens?
i) $HOCl > HOBr > HOI$
ii) $HClO_4 > HClO_3 > HClO_2 > HClO$
- f) How do you prepare chlorine oxofluoride?
- g) How do atomic radii of transition elements vary with atomic number in any series?
- h) What are interstitial compounds? Give an example.
- i) Why Nd^{3+} shows pink colour while Lu^{3+} is colourless?
- j) What is molecular recognition?
- k) Mention any two significance of packing fraction.
- l) What is condensation polymerization? Give an example.

PART - B

Answer any Five questions selecting at least one question from each unit (10×5= 50)

UNIT - I

2. a) What is Borazine? Explain any three methods of preparation of borazine.
b) Compare and contrast borazole with Benzene.
c) Write a note 1:12 tetrahedral heteropolyanions. (4+3+3)
3. a) With suitable examples, explain the structure and bonding in low nuclearity carbonyl clusters.
b) What are Chevrel phases and Zintl ions? Explain. (6+4)

UNIT - II

4. a) Discuss the method of preparation and properties of Caro's acid and Marshall's acid.
b) Explain the structures of $\text{H}_2\text{S}_2\text{O}_7$ and H_2SO_4 (6+4)
5. a) Explain the structures of SeO_2 and SeO_3 molecules
b) Discuss the anomalous property of liquid sulphur. (6+4)

UNIT - III

6. a) Discuss the d-block elements in the following respect:
i) Oxidation state ii) Standard electrode potential
b) Explain the magnetic properties of 3d series. (6+4)
7. a) What are isomers? Explain the types of isomerism with suitable examples.
b) Explain briefly the properties of actinide. (6+4)

UNIT - IV

8. a) Write a note on supramolecular catalysis process.
b) Discuss the application of supramolecular chemistry. (6+4)
9. a) Write a note on the factors that can determine using nuclear size.
b) Describe the classification of the nucleus.
c) Write a note on the n/p ratio and segre plot. (4+3+3)

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M.Sc. CHEMISTRY SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Organic Chemistry -II

Duration:3 Hours

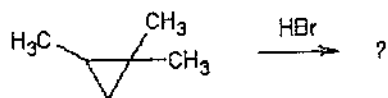
Max Marks:70

PART - A

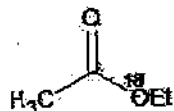
1. Answer any TEN of the following :

(2×10= 20)

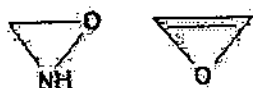
- a) What are ortho, para directing and activating groups? Give examples.
- b) Illustrate E1 mechanism with an example.
- c) What is Chugaev reaction? Give an example.
- d) Predict the product in the following:



- e) Hydrolysis of following ester with NaOH produces ethanol with ^{18}O . Explain.



- f) Give modern statement of Markovnikov's rule with suitable example.
- g) How isoquinoline is prepared from Pomerang-Fritsch synthesis?
- h) Give names for the following structure according to Hantzsch-Widmann nomenclature.



- i) Give any four applications of thirane.
- j) What is the concept of atom economy in green chemistry?
- k) Give any two sonochemical reactions.
- l) What is pinacol rearrangement? Give an example.

PART - B

Answer any Five questions selecting at least one question from each unit

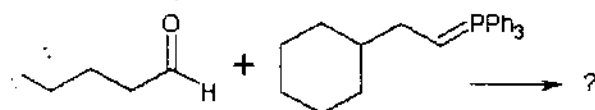
(10×5= 50)

UNIT - I

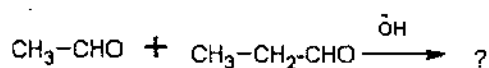
2. a) With suitable examples, discuss the Sommelet-Hauser rearrangement. What are the evidences which support this mechanism?
b) Write a note on benzyne mechanism. (6+4)
3. a) Discuss the mechanism and stereochemistry of S_E1 and S_E2 reactions.
b) Write a note on allylic electrophilic substitution reactions.
c) Explain why E2 reaction is most common elimination reaction among E2, E1 and E1cb? (4+3+3)

UNIT - II

4. a) Illustrate the mechanism and synthetic applications of Knoevenagel condensation reaction.
b) Predict the product and discuss the mechanism: (6+4)



5. a) Explain the mechanisms of the following
(i) Addition of Grignard reagent to carbonyl compounds
(ii) Reformatsky reaction
b) Predict the products and write the mechanism for the following: (6+4)



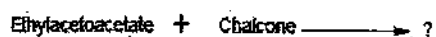
UNIT - III

6. a) Explain the synthetic methods for the preparation of pyrazole.
b) How thiazole is prepared from chloroacetone and sodium thiocyanate?
c) Discuss reactive position of thiazole for an attack of electrophile and nucleophile with an example for each. (4+3+3)
7. a) Explain the important reactions of thiophene.
b) Describe the synthetic methods for pyrrole. (5+5)

UNIT - IV

8. a) Enumerate the different types of reactions for evaluating the type of the reaction involved in green synthesis.
- b) Write a note on the selection of appropriate solvent in green synthesis. (6+4)

9. a) Predict the product and write the mechanism for the following:



- b) How will you obtain Vanillidineacetone by Claisen Schmidt reaction?
- c) Describe the synthesis of 3-pyridyl-4(3H) quinazolinone by solid state reaction. (4+3+3)

CHOICE BASED CREDIT SYSTEM

M.Sc. CHEMISTRY SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Spectroscopy-I

Duration:3 Hours

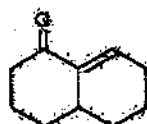
Max Marks:70

PART - A

1. Answer any SEVEN of the following :

(2×7= 14)

- Distinguish between Rayleigh's line, Stokes lines and anti-Stokes lines in Raman spectra.
- Mention any four characteristics of microwave spectroscopy.
- What type of molecules give rotational spectra? Among HCl, CO, H₂ and O₂, which molecule shows rotational spectra?
- A monochromatic radiation is incident on a solution of 0.05 M of an absorbing substance. The intensity of the radiation is reduced to one fourth of the initial value after passing through 1 cm length of the solution. Calculate the value of molar extinction coefficient.
- How will you note the progress of oxidation of 2-propanol to propanone in infrared spectroscopy?
- Find out λ_{\max} for the following ketone



- Why ⁵⁷Co is used as a source in Mossbauer spectral study of iron compounds?
- How do you calculate the nuclear quadrupole coupling constant (eQq) from NQR transitions?
- Calculate the ESR frequency of an unpaired electron in a magnetic field of 0.33 Tesla. (Given: $g = 2$, $\beta = 9.274 \times 10^{-24}$ J/T, $h = 6.626 \times 10^{-34}$ J/S)

PART - B

Answer any Four questions selecting at least one question from each unit.

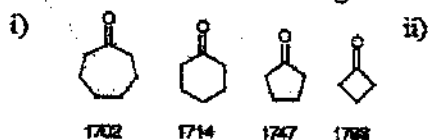
(14×4 = 56)

UNIT - I

2. a) Explain how rotational-vibrational spectroscopy contributes to the study of molecular structure and dynamics.
b) Illustrate P, Q and R branches of the rotation-vibration spectrum.
c) How does the application of Hooke's Law contribute to the interpretation of vibrational spectra in terms of molecular structure and bonding? Discuss. (5+5+4)
3. a) Why diatomic molecules should be considered as anharmonic oscillators? Write a Morse equation for the energy of anharmonic oscillators.
b) Derive an expression for the vibrational energy of a diatomic molecule taking it as a simple harmonic oscillator. Sketch the vibrational energy levels of such a molecule.
c) Outline the fundamental modes of vibration. (5+5+4)

UNIT - II

4. a) Explain the principle and instrumentation of electronic spectroscopy.
b) Define the term 'chromophore'. How will you detect the presence of carbonyl group in aldehydes and ketones?
c) Explain the following terms:
i) Bathochromic shift ii) Hypsochromic shift (5+5+4)
5. a) Identify and explain the shift of vibration peaks of the functional group in the following organic compounds:
i) p- aminoacetophenone and p-methoxy acetophenone
ii) acetaldehyde and acetone
b) Comment on the following:



c) Explain the following:

i) 1°, 2° and 3° amines with respect to their stretching frequencies.

ii) Aromatic and aliphatic amines with respect to their stretching frequencies.

(5+5+4)

UNIT - III

6) a) Write a note on quadrupole splitting and magnetic splitting in Mossbauer spectroscopy.

b) Explain the Mossbauer spectra of $\text{Fe}_3(\text{CO})_{12}$.

c) Describe the applications of NQR spectroscopy.

(5+5+4)

7) a) What is meant by spin labelling method? Outline the rate of electron exchange reaction.

b) Illustrate the ESR spectrum and relative intensities of pyrazine anion.

c) Describe Kramer's Degeneracy.

(5+5+4)

22MCHEE215

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M.Sc./M.Com SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Chemistry in Everyday Life

Duration:3 Hours

Max Marks:70

PART - A

1. Answer any SEVEN of the following : (2×7= 14)

- a) What are the criteria to be taken care of before addition of food additives?
- b) Explain anthocyanin as food colourants.
- c) What do you mean by a perfume?
- d) What are ketoses? Give an example.
- e) Mention the sources of Vitamin A and Vitamin C.
- f) Define rancidity.
- g) What are glycerols? How glycerols are manufactured?
- h) Distinguish between paint and varnishes.
- i) Mention the raw materials that are used for the preparation of shampoos.

PART - B

Answer any Four questions selecting at least one question from each unit.

(14×4 = 56)

UNIT - I

- 2) a) Describe flavours in flavoured milk and yogurts.
b) Explain caramelisation. (7+7)
- 3) a) Explain flavours in cheese and milk.
b) Write a note on the following tastes: i) Sweetness ii) Acidity and sourness (7+7)

UNIT - II

- 4) How are proteins classified? Explain with examples for each classes. (14)
- 5) a) Discuss the ring structure of fructose.
b) Explain the structure of cellulose. (7+7)

UNIT - III

- 6) a) Describe the methods of manufacturing of soaps.
b) What are detergents? How are they classified? (7+7)
- 7) a) Discuss the chemical composition and manufacture of nailpolish and lipstick.
b) Write a note on manufacture of cream and lotion. (8+6)
