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PG2S-277-B-23

M.Sc. II Semester (CBCS) Degree Examination

CHEMISTRY

Inorganic Chemistry - II

Paper : HCT - 2.1

Time : 3 Hours **Maximum Marks:80**

Instructions to Candidates:

1) ALL questions are compulsory.

2) ALL questions carry equal marks.

Answer any EIGHT of the following. **(8×2=16)**

1. a) How do xenon fluorides react with water? Identify the products.

   b) How is S_4N_4 prepared? Draw its structure and comment on the S-S and S-N bonds.

   c) How is closo carborane, $C_2B_{10}H_{12}$ obtained? Draw its possible isomers.

   d) Write the rules for constructing Pigeon hole diagram in electric transition of metal complexes.

   e) Place the given Russel-Saunders terms in ascending order of energy ^3P 'G' P and ^2F justify your answer.

   f) What is meant by Spin Cross over in T-S diagrams?

   g) $[Cr(H_2O)_6]^{3+}$ is inert whereas $[Cr(H_2O)_6]^{2+}$ is labile for ligand substitution reaction substantiate.

   h) Distinguish between oxidative addition and reductive elimination reactions with an example for each.

   i) Why metal-carbon bond in transition metal alkyls unstable.

   j) State 18 electron rule. Explain its significance.

2. a) Give an account of Polymorphism with respect to Sulphur.

   b) What are Phosphazenes? How are trimeric and tetrameric phosphazenes synthesized? Comment on the reactivity of phosphazene ring?

   c) Describe in details the nature of bonding and structures involved in B_2H_6, B_4H_{10} and $B_{10}H_{14}$. **(5+5+6=16)**

(OR)

Explain the structure and bonding of peroxyacids of phosphorus and sulphur.

3. a) With the help of Orgel diagrams discuss the absorption spectra of aquacomplexes of Ti(III) and Cr (III).

b) Describe the different types of charge Transfer transition with suitable examples.

c) Write a note on:

i) Calculation of Racahaparameters for d8 complexes.

ii) Laporte orbital selection rule. **(5+5+6=16)**

(OR)

What is meant by microstates? Calculate the number of microstate for P^2 and d^2 and configuration.

4. a) Describe the mechanism of nucleophithic substitution reactions in square planar complexes.

b) Give an account on racemization and isomerization reactions with examples.

c) Give a mechanism for base hydrolysis of $[Co(NH_3)_5Cl]^{2+}$ and explain the evidence in favors of this mechanism. **(5+5+6=16)**

(OR)

Write briefly on theories of trans effect.

5. a) Discuss the mechanism of Wacker's process.

b) Give the mechanistic aspects of Zeigler-Natta polymerization process.

c) Write and explain the catalytic cycle for the manufacture of acetic acid Monosanto process. Why $[RhI_2(CO)_2]^-$ and CH_3I are the most suitable species for this reaction. **(5+5+6=16)**

(OR)

Discuss briefly on the structure and bonding in metal olefin complexes.

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PG2S-279-B-23

M.Sc. II Semester (CBCS) Degree Examination

CHEMISTRY

Applied physical chemistry-II

Paper - SCT-2.2

Time : 3 Hours **Maximum Marks :80**

Instructions to Candidates:

1) Answer all the questions.

2) All questions carry equal marks.

1. Answer any Eight of the following: **(8×2=16)**

a) Give general aspects of parallel reactions.

b) What are opposite reactions? Give examples.

c) Discuss briefly adsorption isotherms.

d) Give general principle of acid base catalysis.

e) Comment on the effect of temperature on enzyme catalyzed reaction.

f) Write short note on organic light emitting diodes.

g) What are two dimensional nanomaterials? Give examples.

h) Define nanowires and nanorods with suitable examples?

i) What are Mosely lines?

j) Give comparison between Stark and Zeeman effect.

2. a) Discuss the kinetics of formation of HCl from H_2 and Cl_2 molecules. **(5+5+6=16)**

b) Explain chain initiation, chain propagation and chain termination steps of a reaction

c) Explain kinetics of decomposition of ozone.

(OR)

Write notes on

i) Consecutive reactions

ii) Copolymerization.

3. a) Explain Langmuir adsorption isotherm. **(5+5+6=16)**

b) What is enzyme catalysis? Derive Michaelis-Menten equation for enzyme catalysis

c) Explain product of C_3 V symmetry operator.

(OR)

Explain Raman spectra of CO_2 molecule with the help of group theory

4. a) Describe the preparation of nanomaterials by self - propagating high temperature combustion method. **(5+5+6=16)**

b) Write notes on

i) Optical data storage materials

ii) Fullerenes

c) Explain energetic properties of hexanitrohexaazaisowurtzitane.

(OR)

Explain microbial method for the synthesis of nanomaterials.

5. a) Explain Stern- Gerlach experiment. **(5+5+6=16)**

b) Explain atomic spectra of alkali like elements.

c) Descuss simple and compound doublet structure of atomic spectra.

(OR)

Write a note on Paschen back effect.

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PG2S-278-B-23

M.Sc. II Semester (CBCS) Degree Examination

CHEMISTRY

Organic Chemistry - II

(Common to Chemistry and Organic Chemistry)

Paper : HCT - 2.2

Time : 3 Hours **Maximum Marks:80**

Instructions to Candidates: *1) Answer All questions.*

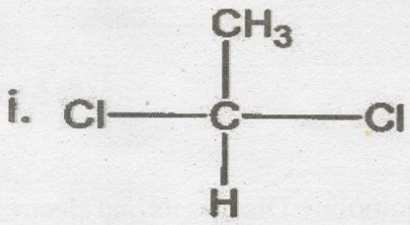
2) All questins carry equal marks.

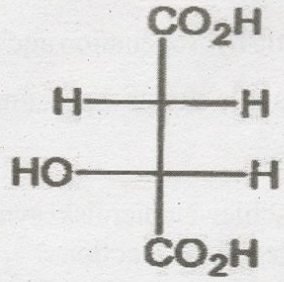
1. Answer any EIGHT of the following. **(8×2=16)**

a) What is SE2 reaction? Write its mechanism by taking suitable example.

b) Write the AAc2 mechanism for ester hydrolysis.

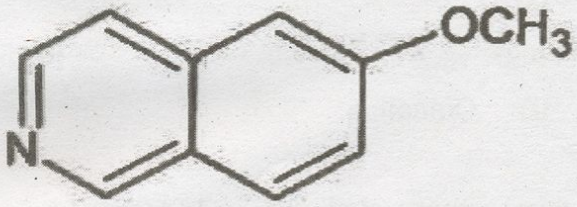
c) Assign the *pro*-R and *pro*-S descriptors for the following paired ligands:

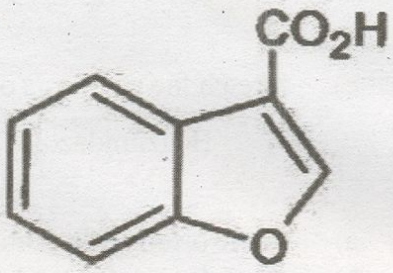
i. 

ii. 

d) Give any one example of stereoselective cyclization.

e) Write the IUPAC names of the following heterocycles:

i. 

ii. 

f) Give any one method for the synthesis of γ - pyrone.

g) Explain the terms elimination and dissolution of drugs used in drug metabolism.

h) What are lead compounds?

i) What is Mannich reaction? Write its mechanism.

j) Give any one synthesis of benzofuran.

2. a) Explain the SNAr and SN1 mechanism with respect to aromatic nucleophilic substitution by taking appropriate examples.

b) Discuss the SEI and SE' mechanism of aliphatic electrophilic substitution reactions suing suitable examples.

c) Write an account on stereochemistry of E1 and E2 reactions.

(OR)

c) Write notes on:

i) Meisenheimer complexes

ii) Reactions involving double bond shifts. **(5+5+6=16)**

3. a) Discuss the addition and subsitution criteria for ligands to be enantiotopic with the help of suitable examples.

b) What is Prelog's rule? Discuss its applications in stereoselective synthesis.

c) Discuss he enantioselective synthesis using at least three examples.

(OR)

c) Write notes on:

i) Catalytic hydrogenation and alkylation

ii) Cram's rule and its dipolar model. **(5+5+6=16)**

4. a) Write the Bischler-Napieralski synthesis of isoquinoline.Discuss its one electrophilic and one nucleophilic reaction.

b) Write the synthesis of flavones and discuss its electrophilic and nucleophilic reactions.

c) Give any one synthesis of the followings:

i) Pyrazole ii) Benzothiophene.

(OR)

c) Sketch the synthesis of the followings: **(5+5+6=16)**

i) Benzimidazole ii) Quinoline.

5. a) Write briefly of quantitative structure activity relationship (QSAR).

b) Give the synthesis of sulfaisoxazole and discuss its mode of action.

c) Discuss the phase-I and phase-II reactions with the help of suitable examples.

(OR)

c) Discuss the factors influencing drug metabolism and availability. **(5+5+6=16)**
