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AC-233740

**M.Sc. (Semester-III)
Examination, Dec.-Jan. (2025-26)**

CHEMISTRY

**(Organometallic Chemistry and
Inorganic Polymers)**

Time Allowed : Three Hours

Maximum Marks : 70

Note : This question paper is divided into four sections.
Attempt questions of all four sections as per direction.
Distribution of marks is given in each section.

SECTION-A

(Objective Type Questions)

Note : Attempt **any ten** questions. Each question carries 1
mark. [10×1=10]

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(1)

[P.T.O.]



1. (A) Choose the correct answer :
- (i) The general order of reactivity for the halide in Pd catalyzed coupling reaction is typically :
- (a) $F > Cl > Br > I$
- (b) $I > Br > Cl > F$
- (c) $Cl > Br > I > F$
- (d) $Br > I > Cl > F$
- (ii) Zeolites are widely used in industrial applications as :
- (a) Electrical insulators
- (b) Catalyst and adsorbents
- (c) Structural material in building
- (d) Organic solvents
- (iii) Metal dienyl complexes typically form what type of bonding :
- (a) Only σ bonds
- (b) Only ionic bonds

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- (c) Non classically bonded π complexes
- (d) Only π bonds without σ contribution
- (iv) Which of these is not an example of an inorganic polymer :
- (a) Silicone rubber
- (b) Teflon
- (c) Rayon
- (d) Polyphosphazene
- (v) A binary polymer system refers to a mixture containing :
- (a) One type of monomer and one type of polymer
- (b) Two different types of monomers that form a copolymer
- (c) Two different polymer component
- (d) Two inorganic compounds

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[P.T.O.]



(vi) π acid ligand that uses its d-orbital during synergic bonding in its complex :

- (a) NO^+ (b) PR_3
(c) C_6H_6 (d) CO

(vii) Coupling reaction involve a catalytic cycle that includes key step :

- (a) Oxidative addition and reductive elimination
(b) Diels Alder reaction and retro-Diels Alder reaction
(c) Witting reaction and hydrolysis
(d) Nucleophilic substitution and E_2 elimination

(viii) When a binary polymer system forms a homogenous mixture it indicates the two components are ?

- (a) Insoluble
(b) Miscible
(c) Cross-linked
(d) Thermosetting

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(B) Fill in the blanks :

- (ix) The structure type of ferrocene is _____.
(x) Polysiloxanes are also known as _____.
(xi) Polyphosphazenes are formed by _____ polymerization.
(xii) In Fischer carbene complex, the metal is typically in a _____ oxidation state.

SECTION-B

(Very Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries 02 marks. (Word limit 25-30 words) [5×2=10]

2. (i) What are metal carbene complex?
(ii) What is inorganic polymer.
(iii) Explain sulphur nitrogen compounds.
(iv) Write a note on co-ordination polymers.
(v) Give preparation of trienyl complexes.
(vi) Explain stille cross coupling.
(vii) What are applications of NMR in studying hydrido complexes?

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[P.T.O.]



SECTION-C

(Short Answer Type Questions)

Note : Attempt **any five** questions. Each question carries **04** marks. (Word limit 250 words) [5×4=20]

3. (i) Discuss bonding in alkene complexes.
- (ii) Explain sonogashira coupling.
- (iii) Explain boron-nitrogen polymers and its applications.
- (iv) Give reactions of alkyne complexes for organic synthesis.
- (v) Describe agostic interaction.
- (vi) Explain nitrosyl complexes with example.
- (vii) Explain wacker process.

SECTION-D

(Long Answer Type Questions)

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Note : Attempt **any three** questions. Each question carries **10** marks. (Word limit 500 words) [3×10=30]

4. (i) Explain synthesis and applications of the following :
- (a) Transition metal alkenyls
- (b) π allyl complexes
- (ii) Explain coupling reaction in detail with example.
- (iii) Discuss catalytic applications of inorganic π acid legands.
- (iv) Discuss the classification of the inorganic polymerization.

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