

SEAT No. _____

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[36]

Sardar Patel University Examination, January-2021
M.Sc. (Inorganic Chemistry) Semester-III
PS03CINC23 (Organometallic compounds)
4th January 2021 (Monday)
Time: 10.00 am to 12.00 noon

Note: Numbers at the right show full marks.

Total Marks: 70

Q.1 [A]. Answer the followings:

[8]

- 1) A strong electropositive metal forms _____ organometallic compound.
(a) ionic (b) σ -bonded
(c) electron deficient (d) π -bonded
- 2) Which the following reaction(s) is/ are two electron oxidative reaction?
(a) $2M + RX \rightarrow M-R + MX$ (b) $M + RX \rightarrow R-M-X$
(c) $M-R + RX \rightarrow R-R + MX$ (d) a and c
- 3) Which one of the followings is a least reactive organolithium?
(a) *n*Bu-Li (b) C_5H_5 -Li
(c) Ph-Li (d) Ph_3C -Li
- 4) In Simmons-Smith reaction, which involves formation of an organozinc intermediate, which reagent(s) can be used?
(a) $ZnCl_2$ and CH_2I_2 (b) $ZnEt_2$ and CH_2I_2
(c) $ZnCl_2$ (d) $ZnEt_2$
- 5) The $Co_2(CO)_8$ is used as catalyst in _____.
(a) Hydrogenation process (b) Monsanto process,
(c) Wacker process (d) Oxo process
- 6) The Monsanto process is carried out using _____ as catalyst.
(a) $[RhI_2(CO)_2]^-$ (b) $RhH(CO)(PPh_3)_3$
(c) $PdCl_2$ and $CuCl_2$ (d) $Co_2(CO)_8$
- 7) _____ drug is a derivative of Arsenic.
(a) Stibamine (b) Silatrane
(c) Salvarsan (d) Stibosan
- 8) Triphenyl tin is used _____.
(a) as growth promoter (b) as fungicide
(c) as herbicide (d) for ripening of fruits

Q.1 [B]. Answer the followings:

[16]

- 1) The hapticity of C_5H_5 group in ferrocene is _____.
- 2) In a metal-hydrogen exchange reaction (e.g., $MR' + R-H \rightarrow M-R + R'-H$), the R-H should be a basic substrate. State true or false.
- 3) Write the products formed in the following reaction;
 $Na^+[Mo(CO)_3(\eta^5-C_5H_5)] + PhCH_2Cl \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$
- 4) Write the reactant used in the following synthesis;
 $Ni(CO)_4 + \underline{\hspace{2cm}} \rightarrow NiCl(\eta^3-C_3H_5)$
- 5) The reaction of toluene ($CH_3-C_6H_5$) with R-Li gives _____.

[1]

[P.T.O.]

- 6) The reaction of a Grignard reagent (R-Mg-X) with CO₂ followed by acid hydrolysis (H₃O⁺) produces _____.
- 7) The oxothalation reactions involve three electron reductions. State true or false.
- 8) The reaction of an organoborane (BR₃) with H₂O₂/ NaOH produces _____.
- 9) The polymerization of butadiene using Bu-Li as catalyst in a polar solvent results to 1,2-addition polymer. State true or false.
- 10) Write the name of a catalyst used in Water Gas Shift Reaction.
- 11) Write the product(s) formed in metathesis reaction of CH₃-CH=CH₂ using WCl₆ and AlCl₂Et in ethanol.
- 12) The hydroformylation of an alkene gives _____ as major product.
- 13) Give a name of organomercury compound used as diuretic.
- 14) Give an example of organo-antimony compound used as anti-parasite.
- 15) Write the name of a natural methylating agent.
- 16) The _____, an organosilicon compound, is used for ripening of fruits.

Q.2. Answer any SEVEN of the followings:

[14]

- 1) What are σ - and π - bonded organometallic compounds? Give examples.
- 2) Write a transmetallation reaction used for the synthesis of main group organometallic compounds.
- 3) Write a method for the synthesis of ferrocene.
- 4) What is Hydrosilylation reaction? Give an example.
- 5) Write the uses of organothallium compounds in organic synthesis.
- 6) Write the steps involved in the catalytic reactions involving organometallic compounds as catalyst.
- 7) What are Wilkinson catalyst and its use?
- 8) Write the usefulness of the silylated derivative of a bioactive organic compound.
- 9) Write the names of some of organometallic compounds which are widely used as pesticides.

Q.3 [A] Discuss methylene insertion reactions and elimination reactions for the preparation of main group organometallic compounds. [4]

[B] Write the preparation and important chemical reactions of a η^5 -complex. [4]

Or

[A] Discuss oxidative-addition reactions and carbanion-halide exchange reactions for the synthesis of main group organometallic compounds. [4]

[B] Discuss the chemical reactions of organolithium compounds. [4]

Q.4 [A] Discuss the uses of Grignard reagents in organic synthesis. [4]

[B] Write a short note on oxymercuration-demercuration reaction. [4]

Or

[A] Describe the uses of organozinc compounds in organic synthesis. [4]

[B] Write a short note on hydroboration reaction. [4]

- Q.5 [A] Describe the hydroformylation process with mechanism of involved reactions. [4]
[B] Discuss a catalytic process for conversion of carbon monoxide into acetic acid. [4]

Or

- [A] Discuss the mechanism of Ziegler-Natta polymerization. [4]
[B] Describe the Wacker process with mechanism of the involved reactions. [4]

- Q.6 [A] Discuss the applications of organometallic compounds as catalyst in various industrial processes. [4]
[B] Discuss the uses of organotin and organosilicon compounds in agriculture and horticulture. [4]

Or

- [A] Discuss the uses of organosilicon compounds as medicine. [4]
[B] Write a short note on environmental methylation. [4]

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