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**AI—49—2017**

**FACULTY OF SCIENCE**

**M.Sc. (Fourth Semester) EXAMINATION**

**MARCH/APRIL, 2017**

**(Revised Course)**

**INORGANIC CHEMISTRY**

Paper 541/4

(Organometalic Catalysis and Fluxionality)

**(Friday, 21-4-2017)**

**Time : 2.00 p.m. to 5.00 p.m.**

*Time—3 Hours*

*Maximum Marks—75*

*N.B. :— (i) All questions are compulsory.*

*(ii) All questions carry equal marks.*

1. Solve any *three* out of five : 15

- Write formula of Reppe's catalyst and write its application.
- Describe the synthesis of acetic acid using Ziegler-Natta catalyst.
- Explain the different steps involved in catalytic reactions.
- Give details of Suzuki coupling reaction.
- Enlist various applications of zeolites.

2. Solve any *three* out of five : 15

- Draw and explain Tolmen catalytic cycle.
- Classify catalysts based on their activity and toxicity.
- Describe method of determining rate of fluxionality.
- Discuss physic-chemical principle of ammonia synthesis.
- Explain the mechanism of Water gas Shift reaction.

3. Answer the following :

(A) Discuss the features of Hydrosilation with example. 8

*Or*

Discuss the Fluxionality in  $n^3$  allyl complex with example.

P.T.O.

- (B) Explain the synthesis of Fischer-Tropsch. 7
- Or*
- Describe various properties of zeolites.
4. Answer the following :
- (A) Discuss the mechanism of Wolff-kishner reactions. 8
- Or*
- Explain the reactivity of heterogeneous catalysis with respect to their porosity.
- (B) Describe the synthesis of acetic acid by Monsoanto process. 7
- Or*
- Discuss the uses of Electrocatalysis.
5. (A) Choose the *correct* option from the given alternatives : 5
- (1) Hydrodormylation of ..... can afford two isomeric products, butyraldehyde or isobutyraldehyde.
- (a) Acetylene
- (b) Ethylene
- (c) Butene
- (d) Propylene
- (2) The addition of trichlorosilane to ..... give 1-phenyl-1 (trichlorosilyl) ethane.
- (a) Styrene
- (b) Benzene
- (c) Phenol
- (d) Ethane
- (3) At temperatures near 100°C, the 500 MHz NMR spectrum of dimethyl formaldehyde shows ..... for the methyl groups.
- (a) One signal
- (b) Two signal
- (c) Three signal
- (d) No signal

- (4) Ziegler-Natta catalysts the alkylaluminium cocatalysts are unstable in air and preserved in inert atmosphere due to its ..... nature.
- (a) ferroelectric
  - (b) dielectric
  - (c) pyrophoric
  - (d) piezoelectric
- (5) Mineral formula for Natrolite is .....
- (a)  $\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_8 \cdot 2\text{H}_2\text{O}$
  - (b)  $\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_{10} \cdot 2\text{H}_2\text{O}$
  - (c)  $\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_{12} \cdot 2\text{H}_2\text{O}$
  - (d)  $\text{Na}_2\text{Al}_3\text{Si}_3\text{O}_{10} \cdot 2\text{H}_2\text{O}$
- (B) Write brief notes on (any two) :
- (a) Chemisorption
  - (b) Wacker process
  - (c) Alkene polymerization.

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