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BR—65—2016

FACULTY OF SCIENCE

M.Sc. (Second Year) (Fourth Semester) EXAMINATION

OCTOBER/NOVEMBER, 2016

(CBCS Pattern)

INORGANIC CHEMISTRY

Paper XVII-(CH-541/1)

(Organometallic Catalysis and Fluxionality)

(Thursday, 17-11-2016) **Time : 2.00 p.m. to 5.00 p.m.**

Time—Three Hours *Maximum Marks*—50

N.B. :— (*i*) Attempt *All* questions.

(*ii*) Figures to the right indicate full marks.

1. Answer any *five* of the following : 10

(*a*) Draw structure of sodium borohydride.

(*b*) Discuss the effect of porosity on catalytic effect.

(*c*) What is water gas shift reaction ?

(*d*) Explain the polymerisation of alkenes using Ziegler-Natta catalyst.

(*e*) Name the Wilkinson's catalyst and write its application.

(*f*) What are the essential properties of catalysts ?

(*g*) Highlight the applications of zeolites.

(*h*) Define and explain the term rate of fluxionality.

2. Attempt any *four* of the following : 10

(*a*) Describe the use of Heterogeneous catalysis in synthetic chemistry.

P.T.O.

(*b*) Explain the mechanism of Heck reactions.

(*c*) Discuss the role of catalyst in Wacker process.

(*d*) Discuss the principle of hydroformylation of olefins.

(*e*) How stereochemical non-rigidity is detected ?

(*f*) What is surface migration in relation to catalysis ?

3. Answer any *two* of the following : 10

(*a*) What is Epoxidation ? Explain with example.

(*b*) Distinguish between chemisorption and desorption.

(*c*) Draw and explain Tolmen catalytic cycle.

4. Answer any *two* of the following : 10

(*a*) Describe the acetic acid synthesis by Monsoanto process.

(*b*) Discuss the principle of Fishcher-Tropsch synthesis

(*c*) Explain the catalytic steps involved in homogeneous catalysis.

5. (A) Choose the correct alternatives : 5

(*i*) In the hydrogenation of edible oil ..... is used as a catalyst.

(*a*) Roney Nickel

(*b*) Devard's alloy

(*c*) Palladium chloride

(*d*) Vanadium pentaoxide

(*ii*) The ..... is the chemical reaction of an unsaturated halide with an alkene in the presence of a base and a palladium

catalyst to form a substituted alkene.

(*a*) Hydrocarboxylation

(*b*) Heck reaction

(*c*) Birch Clemmenson's reaction

(*d*) Wolf-Kishner reaction

(*iii*) Monsanto process operates at a pressure of ..... and at ..... to give selectivity greater than 99%.

(*a*) 10–20 atm and at 50–80°C

(*b*) 60–80 atm and at 100–120°C

(*c*) 30–60 atm and at 150–200°C

(*d*) 10–20 atm and at 100–200°C

(*iv*) The ..... is an industrial method for the manufacture of acetic acid by catalytic carboxylation of methanol.

(*a*) Fishcher–Tropsh synthesis

(*b*) Hydroxylation

(*c*) Wacker's process

(*d*) Monsanto process

(*v*) In Wacker's process, formation of C–O double bond proceeds through ..... with a cyclic four-membered transition state.

(*a*) β-hydride addition (*b*) β-hydride oxidation

(*c*) β-hydride elimination (*d*) β-hydride reduction

(B) Write brief notes on (any *two*) : 5

(*a*) Fluxionality in cyclopentadienyl complexes

(*b*) Reppe's catalysis

(*c*) Ammonia synthesis.