SARDAR PATEL UNIVERSITY

M.Sc. INDUSTRIAL CHEMISTRY, SECOND SEMESTER EXAMINATION,

PS02CICH02, INDUSTRIAL PROCESS CHEMISTRY

Dt. 28-04-2012, Saturday

Time:11:00 am to 02:00 pm **Total Marks:70**

Q.1: Answer the following questions. **(8)**

1) For chlorination and bromination reactions, steel body apparatus is protected by ____.

   (a) Copper (b) Nickel (c) Lead (d) None of these

2) The difference in activation energy between various methods of chlorination depends on:

   (a) Chain propagation step (b) Catalyst
   (c) Chain termination step (d) Chain initiation step

3) How many side reactions are possible in case of hydration process?

   (a) One (b) Three (c) Two (d) Four

4) In mechanism of esterification, first step is formation of:

   (a) Protonated ester (b) Oxonium ion

   (c) Carbanion (d) Protonated carboxylic acid

5) Isopropyl benzene is used to synthesis of:

   (a) Cumene hydroperoxide (b) Cumene

   (c) Cumene dioxide (d) Cumene hydroxide

6) Which catalyst is used in alkylation of phenol?

   (a) H_2SO_4 (b) HF (c) $AlCl_3$ (d) None of these

7) In tried flow sheet, catalyzer is filled with which type of packing?

   (a) Cotton packing (b) Pumice packing

   (c) Porous packing (d) None of these

8) When nitric acid is used as oxidizing agent, it is reduced to :

(a) Nitrogen peroxide (b) Nitrate

(c) Nitrogen oxide (d) None of these

Q.2: Answer the following questions in brief. (Any Seven) **(14)**

1) Explain the thermodynamics of halogenation reaction.

2) Explain the chain termination in chlorination process.

3) Write the mechanism of hydration process.

4) Illustrate the thermodynamics of esterification process.

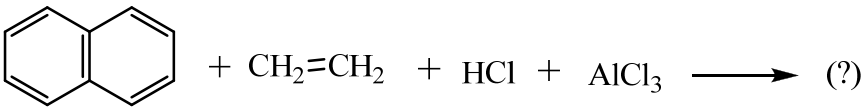
5) Explain the tubular reactor in case of C- alkylation.

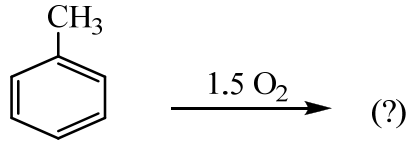
6) Write the mechanism of phenol alkylation.

7) What is oxo synthesis? Explain with example.

8) Explain the HNO_3 as oxidizing agent.

9) Complete the following reactions:

(a) 

(b) 

Q.3 (A): Illustrate the flow diagram for the production of allyl chloride. **(6)**

Q.3 (B):

1) Explain any two reactors, which are used in gas phase chlorination. **(6)**
2) Explain halogenating agents.

OR

Q.3 (B): Describe the products obtain by liquid phase chlorination. **(6)**

Q.4 (A): Explain the flow diagram for the production of ethanol synthesis. **(6)**

Q.4 (B): Describe the reactors used in esterification process. **(6)**

OR

Q.4 (B): Answer the following questions. **(6)**

1) Explain the products obtained by hydration process.
2) Illustrate the equilibrium of esterification process.

Q.5 (A): Explain the alkylating agents in detail. **(6)**

Q.5 (B): Explain the flow diagram for the synthesis of ethyl or isopropyl benzene by alkylation process. **(6)**

OR

Q.5 (B): Answer the following questions. **(6)**

1) Describe the catalysts used in alkylation of phenol.
2) Explain the following reactors.
   (a) Cascade of stirred reactor (b) column type reactor

Q.6 (A): Explain the catalysts used for oxo synthesis in detail. **(6)**

Q.6 (B): Explain the mechanism of oxo synthesis in detail. **(6)**

OR

Q.6 (B): Answer the following questions. **(6)**

1) Write the side reactions of oxo synthesis.

2) Illustrate any two classifications of oxidation process.

Best of Luck