

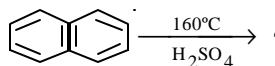
(v) What is chlorination of alkane ? 1

(vi) Complete the following reaction :  
 $\text{CH}_3\text{COOH} \xrightarrow{?} \text{Cl}-\text{CH}_2-\text{COOH}$ . 1

(vii) Which halogenation requires more energy ? 1

(viii) Define oxidation reaction. 1

(ix) Which electrophile is used for sulphonation of naphthalene ? 1

(x) Complete the following reaction.  
 1

(xi) How many types of alkylation ? 1

(xii) What is role of catalyst in hydrogenation reaction ? 1

**NTK/KW/15/5848**

**Bachelor of Science (B.Sc.) Semester-III Examination**  
**Paper-II : INDUSTRIAL CHEMISTRY (ICH-302)**

Time—Three Hours] [Maximum Marks—50

**N.B. :** (1) All **FIVE** questions are compulsory and carry equal marks.  
(2) Draw diagrams and write equations wherever necessary.

1. (A) Explain the mechanism of nitration of Benzene. 5  
(B) How will you convert the following :  
(i) Chlorobenzene to ortho and para nitrobenzene  
(ii) Acetanilide to para nitro acetanilide. 5

**OR**

(C) Explain the nitration of Toluene. 2½  
(D) Explain the kinetics of nitration with suitable example. 2½

(E) Discuss the nitration of paraffinic hydrocarbon. 2½

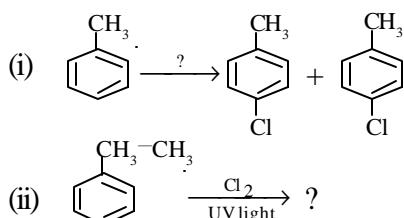
(F) Why nitration of chlorobenzene is possible at ortho and para position ? 2½

2. (A) Explain the mechanism of chlorination with suitable example. 5

(B) Explain with suitable reagents used for halogenation of aromatic side chain and nuclear halogenation. Give one example of each. 5

**OR**

(C) How is chloral manufactured ? 2½  
 (D) Which reagents are suitable for aromatic side chain and nuclear halogenation ? 2½  
 (E) How will you prepare dichloromethane industrially ? 2½  
 (F) Complete the following reactions :



3. (A) Explain the mechanism of sulphonation of Benzene. 5

(B) How will you prepare following commercially :  
 (i) Acetaldehyde  
 (ii) Acetic acid ? 5

**OR**

(C) Give the mechanism of alkyl benzene. 2½  
 (D) What is meant by oxidising agent ? What is role of oxidising agent in chemical reaction ? 2½

(E) Explain the kinetics of sulphonation. 2½  
 (F) How will you prepare phthalic anhydride commercially ? 2½

4. (A) What is hydrogenation ? Give any two hydrogenating agents. Explain role of hydrogenating agent in hydrogenation reaction. 5  
 (B) Explain the mechanism of alkylation reaction with suitable example. 5

**OR**

(C) How will you manufacture methanol from carbon monoxide and hydrogen ? 2½  
 (D) How is alkyl benzene manufactured industrially ? 2½  
 (E) How will you convert ethyl acetate to ethyl alcohol ? 2½  
 (F) Discuss the hydrogenation of vegetable oil. 2½

5. Attempt any **TEN** of the following :  
 (i) Write the chemical reaction of formation of nitronium ion. 1  
 (ii) Define nitration. 1  
 (iii) What is role of conc.  $H_2SO_4$  during nitration ? 1  
 (iv) What types of reagent are used in preparation of chlorobenzene ? 1