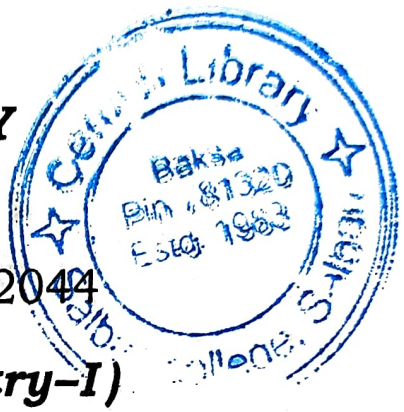
Total number of printed pages–7

63(FY) SEM–4/MAJ/CHMMAJ2044

2025



CHEMISTRY

(Major)

Paper : CHMMAJ2044

(Organic Chemistry–I)

Full Marks : 50

Pass Marks : 20

Time : Two hours

The figures in the margin indicate full marks for the questions.

1. Choose the correct answer : 1×5=5

   (i) The correct order of reactivity of halides towards nucleophilic substitution is—

   (a) alkyl < allyl < benzyl

   (b) benzyl < allyl < alkyl

   (c) allyl < alkyl < benzyl

   (d) allyl < benzyl < alkyl

(ii) Which of the following mechanism is involved in the Cine substitution ?

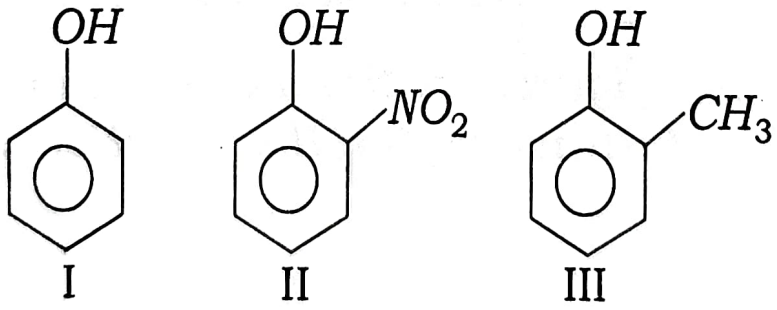
(a) S_N1 mechanism

(b) S_NAr mechanism

(c) Benzyne mechanism

(d) $S_{RN}1$ mechanism

(iii) The correct arrangement of acidity of the following phenols in increasing order of their acid strength is—



I II III

(a) I < II < III

(b) II < I < III

(c) III < II < I

(d) III < I < II

(iv) Which of the following is added as catalytic poison is the Rosenmund reduction to prevent further reduction to alcohol ?

(a) pyridine, sulphur

(b) pyridine, phosphorus

(c) pyridine, camphore

(d) pyridine, platinum

(v) Carboxylic acid containing α-hydrogen on reaction with bromine is presence of red phosphorus results—

(a) acid bromide

(b) alkyl bromide

(c) α-bromo carboxylic acid

(d) α, β-unsaturated carboxylic acid

2. Answer the following questions : ***(any five)*** 2×5=10

(i) Explain the effect of solvent on the mechanism of nucleophilic substitution of alkyl halides.

(ii) What precautions are needed to be taken in the preparation of Grignard reagent from alkyl halide and magnesium ?

(iii) Write the mechanism of pinacol-pinacolore rearrangement.

(iv) How esters can be reduced alcohols by Bouveault-Blanc reduction ?

(v) What is the importance of α-hydrogen in aldol condensation ?

(vi) What is Arndt-Eistert reaction ? Give the chemical reactions involved.

(vii) Write *two* synthetic application of Grignard reagents.

3. Answer the following : ***(any five)*** 5×5=25

(i) Write the mechanistic steps involved in the S_N1 mechanism of nucleophilic substitution. Explain its kinetics and stereochemistry. 3+2=5

(ii) Explain the S_NAr mechanism of nucleophilic substitution is aromatic system. Write *any two* evidences in support of this mechanism. 3+2=5

(iii) How all the *three* types of alcohols can be prepared from Grignard reagent? What happens when Glycol is oxidised with periodic acid? 3+2=5

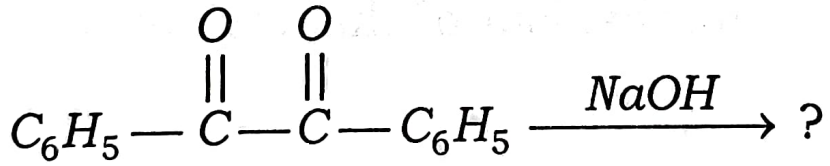
(iv) Write short notes on : 2½×2=5

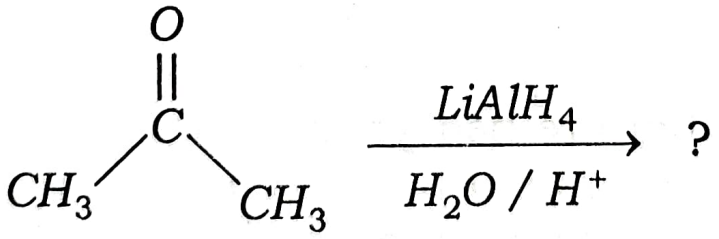
(a) Fries rearrangement

(b) Reimer-Tiemann reaction

(v) Complete the following reactions and write the mechanism involved :

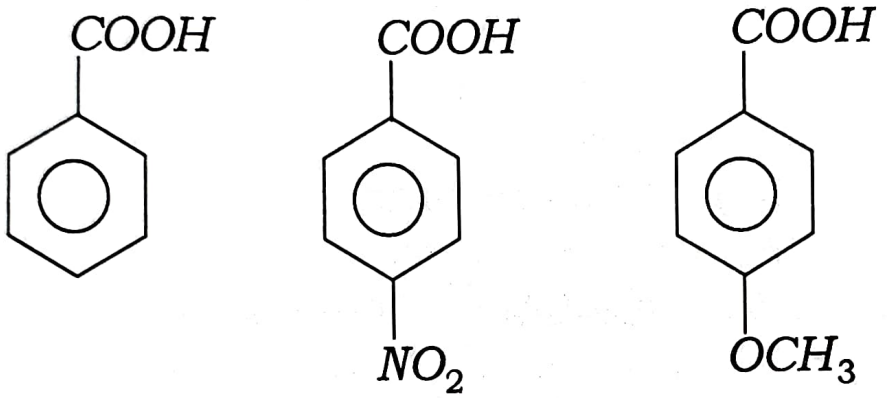
2½×2=5

(a) 

(b) 

(vi) Cannizzaro reaction takes place via hydride transfer mechanism. Explain.

(vii) Explain the comparative acidity of mono carboxylic acids having electron donating substituents and electron withdrawing substituent. Arrange the following in increasing order of their acid strength. 4+1=5



(viii) What is Hoffmann degradation? How a higher carboxylic acid can be converted to its lower homologue via Hoffmann degradation? Write the mechanism of this step also. 1+4=5

4. Answer the following questions : ***(any one)*** 10

(i) What are benzynes? Give the directive influence of benzyne in aromatic nucleophilic substitution. How benzyne can be trapped or isolated? What will happen if an aryl halide with two ortho substituents is allowed to react with $NH_2^{(-)}$? 2+4+2+2=10

(ii) Explain Knoevenagel reaction. Write briefly about Wittig reaction. How carbonyl compounds reacts with ammonia and ammonia derivatives? State briefly about benzoin condensation.
2+2+4+2=10