SET – A

Name of Course : B Sc (Hons.) Chemistry

Semester : III

Name of the Paper : Organic Chemistry II(Halogenated hydrocarbons and Oxygen Containing Functional Groups)

Unique Paper Code : 32171302

Duration : 3 hrs

Maximum Marks :75

**Instructions for candidates**

1. Attempt any 4 questions
2. Attempt all parts of a question at one place
3. All questions carry equal marks

1.

a) What happens when benzaldehyde is treated with (Explain with mechanism)
   i. Aqueous alcoholic KCN
   ii. Hydrazine

b) A ketone (A) gives iodoform test. (A) on hydrogenation gives (B) which on heating with $H_2SO_4$ gives (C). Action of $O_3$ on (C) gives (D) which when treated with water in presence of Zn dust gives only acetaldehyde. Identify (A), (B), (C), (D) and write the reactions involved.

c) Explain the following
   i. Acid catalyses the addition of semi-carbazide to acetone, but too much acidity of medium is harmful for the reaction.
   ii. Why acetaldehyde is more reactive than acetone towards nucleophilic addition?

d) Synthesize the following using diethyl malonate
   i. Barbituric acid
   ii. 3-methyl butanoic acid

e) Mention a reagent to which acetaldehyde and benzaldehyde react similarly and another reagent to which they react differently also write the reactions.

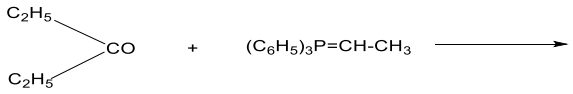
(4,4,4,4,2.75)

2.

a) How will you obtain the following from acetoacetic ester (any 2)
   i. Isobutyric acid
   ii. Methyl propyl ketone
   iii. Acetyl acetone

b) benzaldehyde $\xrightarrow{CH3MgI\ /\ H3O}$ A $\xrightarrow{mild\ oxd.}$ B $\xrightarrow{I2/OH-}$ C
Identify A, B, C

c) Complete and name following reaction
   i. $(CH_3)_3CCHO + (CH_3)_3CCHO \xrightarrow{50\%\ NaOH}$

ii. 

iii. $C_6H_5CHO + (C_6H_5)_3P{=}CH_2 \longrightarrow$

iv. $C_5H_5CHO + CH_2(COOC_2H_5)_2 \longrightarrow$

d) Explain the following
   i. How you can differentiate between acetaldehyde and acetone. Write the reaction also
   ii. How you can differentiate between acetaldehyde and benzaldehyde. Write the reaction also

e) How you can convert butanone to
   i. 2-butanol
   ii. n-butane

(4,4,4,4,2.75)

3. Explain
   i. Neopentyl halide are notoriously slow in nucleophilic substitution whatever the experimental conditions are
   ii. Which of the following 2 synthesis is preferred for tertiary butyl ether
      1. $(CH_3)_3CO^- + CH_3CH_2Br \longrightarrow$
      2. $(CH_3)_3C\text{-}Br + CH_3CH_2O^- \longrightarrow$

   b) Compare the reactivity of chlorobenzene and 2,4 – dinitrochlorobenzene towards NaOH
   c) Account for the formation of m-$MeOC_6H_4NH_2$ from ammonolysis of either o- $MeOC_6H_4Br$ and m-$MeOC_6H_4Br$
   d) Give the major product and mechanism for the following reactions
      i. $CH_3CH_2CH_2CH_2Br + CH_3O^- + CH_3OH^- \longrightarrow$
      ii. $(CH_3)_3CBr + {}^-SH + C_2H_5OH \xrightarrow{50°C}$
   e) Nitration of bromobenzene is much faster than bromination of nitrobenzene

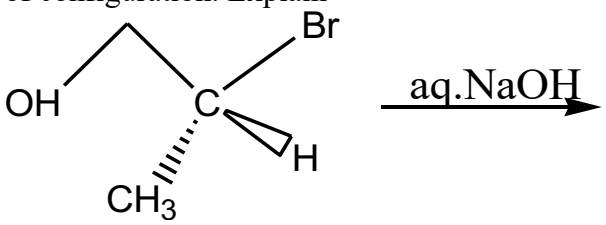
(4,4,4,4,2.75)

4.
   a) Acid or base catalyzed hydrolysis of $(C_2H_5)_3C - CN$ proceeds up to amide stage. The corresponding acid is not obtained
   b) Give the mechanism of hydrolysis of methyl benzoate by $NaOCH_3$ in $CH_3OH$.
   c) How can an ester be converted to beta keto ester what is the name of the reaction? Explain with mechanism
   d) Give the mechanism of ethanamide with bromine in presence of KOH
   e) Giving reasons arrange the following acids in increasing order of acidity $CH_2Cl$-COOH, $CH_3$- COOH, $CH_2{=}CHCH_2COOH$, $CI_3COOH$

(4,4,4,4,2.75)

5.
   a) Write the structure of alcohol formed from $(CH_3)_2C{=}CH\text{-}CH_3$ on hydroboration - oxidation, give the mechanism involved.
   b) How will you carry out the following conversions
      i. Acetone to 2-methyl-2-butanol
      ii. n-propanol to butanamide
   c) Write a test along with reaction involved to distinguish between the following pairs of compounds
      i. Phenol and Benzyl alcohol
      ii. Ethyl alcohol and Diethyl ether

d) Why the substitution of bromine in the following reaction proceeds with retention of configuration. Explain

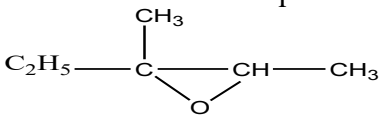



e) What products are formed when Anisole is heated with HI? Explain with the help of mechanism.

(4,4,4,4,2.75)

6.

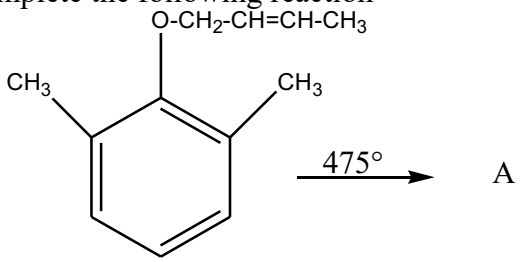
a) Write the reaction sequence involved in the ring opening




with methanol in presence of acid.Explain the formation of different products on reaction with sodium methoxide.

b) Compare the solubility,volatility and acidity of o-nitrophenol and p-nitrophenol.

c) Complete the following reaction




Identify A, name of the reaction and explain the formation of A with mechanism.

d) Explain the order of reactivity of the following compounds with HBr and mechanism involved $Ph_2CHOH$, $PhCH_2OH$, p-$NO_2$-Ph-$CH_2OH$, p-Cl-Ph-$CH_2OH$

e) In the following reaction Name the reagent and identify A.

$(CH_3)_2C(OH)CH_3$. $\xrightarrow{Fe2+,H2O2}$

(4,4,4,4,2.75)