INDIAN SCHOOL MUSCAT

CHEMISTRY DEPARTMENT

QUESTION BANK

Aldehydes, Ketones and carboxylic acids

1. Draw the structure of the following :
   i) 4- Methoxybenzaldehyde
   ii) 5- Bromo -3- Chloro -2- iodobenzoic acid
   iii) 3,3 – Dimethyl -1- Chlorobutane
   iv) 2,3- Dihydroxy -4-methylpentanal
   v) 3- Hydroxy-2-methyl –propanal
   vi) 2,4 –Dimethyl -3- pentanone
   vii) 1,2 –Ethaneodioc acid
   viii) 3- Pentene -2-one
   ix) 1,3 – Propane –dioic acid
2. Give IUPAC names of following:
   i) $CH_3CH(CH_3)CH_2CH_2CHO$
   ii) $CH_3CH_2COCH(C_2H_5)CH_2CH_2Cl$
   iii) $OHCC_6H_4CHO$-*p*
   iv) $(CH_3)_3CCH_2COOH$
   v) $CH_3CH=CHCHO$
   vi) $CH_3COCH_2COCH_3$
   vii) $CH_3CH(CH_3)CH_2C(CH_3)_2COCH_3$
   viii) $CH_3CO(CH_2)_4CH_3$
   ix) $CH_3CH_2CHBrCH_2CH(CH_3)CHO$
   x) $CH_3(CH_2)5CHO$
   xi) Ph-CH=CH-CHO
   xii) PhCOPh
3. Draw structures of the following derivatives.
   i) The 2,4-dinitrophenylhydrazone of Benzaldehyde
   ii) Cyclopropanoneoxime
   iii) Acetaldehydedimethylacetal
   iv) The semicarbazone of cyclobutanone
   v) The ethylene ketal of hexan-3-one
   vi) The methyl hemiacetal of formaldehyde
4. Give Reasons :-
   i) Carboxylic acid is stronger acid than phenol.
   ii) Ethanol is more soluble in water than ethyl chloride.
   iii) Aldehydes are more reactive than Ketones towards nucleophilic additions.
   iv) Carboxylic acids has higher boiling points than alcohols of same no. of carbonatoms.
   v) Ethanoic acid has molar mass of 120 in vapour state.
   vi) Carboxylic acids do not give characteristic reactions of carbonyl group.
   vii) Formal dehyde does not undergo aldol condensation.
   viii)Fluoro acetic acid is a stronger acid than acetic acid.
5. Convert the following:
   i) Toluene to Benzaldehyde
   ii) Acetaldehyde to Acetamide
   iii) Methanol to acetic acid
   iv) Methanol to Ethanol
   v) Acetic acid to Propionic acid

vi) Ethyl alcohol to acetone
vii) Acetone to tert- butyl alcohol
viii) Toluene to m- nitrobenzoic acid
ix) Phenol to acetophenone
x) Acetaldehyde to Acetone

6. Give simple chemical tests to distinguish between the following pairs of compounds.
   i) Propanal and Propanone
   ii) Acetophenone and Benzophenone
   iii) Phenol and Benzoic acid
   iv) Benzoic acid and Ethyl benzoate
   v) Pentan-2-one and Pentan-3-one
   vi) Benzaldehyde and Acetophenone
   vii) Ethanal and Propanal
7. Describe the following:
   i) Acetylation
   ii) Cannizzaro reaction
   iii) Cross aldol condensation
   iv) Decarboxylation
8. Write chemical reactions to affect the following transformations:
   i) Butan-1-ol to butanoic acid
   ii) Benzyl alcohol to phenylethanoic acid
   iii) 3-Nitrobromobenzene to 3-nitrobenzoic acid
   iv) 4-Methylacetophenone to benzene-1,4-dicarboxylic acid
   v) Cyclohexene to hexane-1,6-dioic acid
   vi) Butanal to butanoic acid.
9. Which acid of each pair shown here would you expect to be stronger?
   i) CH_3CO_2H or CH_2FCO_2H
   ii) CH_2FCO_2H or CH_2ClCO_2H
   iii) $CH_2FCH_2CH_2CO_2H$ or $CH_3CHFCH_2CO_2H$
10. Write the structure of alkenes that on ozonolysis will give ketone only.
11. What is the function of $BaSO_4$ in rosenmund reaction?
12. Name the isomers with molecular formula C_3H_6O.
    Which one will have high boiling point?
13. What happens when acetaldehyde is kept with a trace of sulphuric acid?
    Write the structure of product.

14. What is the chemical name of Tollen's reagent and Fehling's solution
15. An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent and undergoes Cannizzaro reaction. On vigorous oxidation, it gives 1,2-benzenedicarboxylic acid. Identify the compound.
16. A compound 'A' with formula $C_5H_{10}O$ gives a positive 2, 4 –DNP test but a negative Tollen's test It can be oxidizing to carboxylic acid 'B' of molecular formula $C_3H_6O_2$, when treated with alk. $KMnO_4$ under vigorous conditions. The salt of 'B' gives a hydrocarbon 'C' on Kolbes' electrolytic decarboxylation. Identify A,B,C & write chemical equations.

17. A compound A with molecular formula $C_5H_{12}O$ on oxidation forms compound B with molecular formula $C_5H_{10}O$. The compound B gives iodoform test but does not reduce ammoniacal silver nitrate. The compound B on reduction with Zn – Hg/ HCl gives compound C with molecular formula C_5H_{12}. Identify A,B,C& give the chemical reactions involved.
18. Arrange the following compounds in increasing order of their property as indicated:
    i) Acetaldehyde, Acetone, Di-*tert*-butyl ketone, Methyl *tert*-butyl ketone (reactivity towards HCN)
    ii) $CH_3CH_2CH(Br)COOH$, $CH_3CH(Br)CH_2COOH$, $(CH_3)_2CHCOOH$, $CH_3CH_2CH_2COOH$ (acid strength)
    iii) Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid (acid strength)
19. An organic compound A, which has a characteristic odour, on treatment with NaOH forms two compound B and C. Compound B has molecular formula C_7H_8O which on oxidation gives back A. Compound C is the sodium salt of an acid. C, when heated with soda lime yields an aromatic hydrocarbon D. deduce the structures of A to D.
20. Two moles of compound (A) on treatment with a strong base gives two compounds (B) and (C). The compound (B) on dehydrogenation with Cu gives (A) while acidification of (C) gives carboxylic acid (D) having molecular formula CH_2O_2. Identify (A) to (D).