

### Word Problems of organic chemistry

1. Primary alkyl halide (a)  $C_4H_9Br$  reacted with alcoholic KOH to give compound (b). Compound (b) is treated with HBr to give compound (c) which is an isomer of (a). When (a) was reacted with sodium metal it gave a compound (d)  $C_8H_{18}$  that was different than the compound when n-butyl bromide was reacted with sodium. Give the structural formula of (a) and write the equations for all the reactions.
2. An organic compound 'A' with molecular formula  $C_4H_9Br$  on treatment with alcoholic KOH gave two isomeric compounds 'B' & 'C' with the formula  $C_4H_8$ . On ozonolysis, 'B' gave only one product  $CH_3CHO$  while 'C' gave two different products. Identify the compounds A, B & C.
3. A chloro compound A on reduction with Zn - Cu and alcohol gives the hydrocarbon B with five carbon atoms. When A is dissolved in ether and treated with sodium, 2,2,5,5-Tetramethylhexane is formed. Write the structures of A & B and reactions involved.
4. A dihalogen derivative A of a hydrocarbon having two carbon atoms reacts with alcoholic KOH and forms another hydrocarbon which gives a red ppt. with ammoniacal solution of cuprous chloride. Compound A gives an aldehyde when treated with aq. KOH. Write the name and formula of the compound A. Also write the reactions involved.
5. With alcoholic KOH, compound A  $C_3H_7Br$  gives B ( $C_3H_6$ ). B on oxidation gives acetic acid, carbon dioxide and water. With HBr, it gives D, an isomer of A. Identify A to D and also write the reactions involved.
6. An organic compound A on treatment with  $CHCl_3$  and KOH give B & C. Both B & C give the same product D when distilled with zinc dust. Oxidation of D gives E of formula  $C_7H_6O_2$ . The sodium salt of E on heating with soda lime gives F which may also be obtained by distilling A with Zn dust. Identify A to F compounds. Also write the reactions involved.
7. A compound A with molecular formula  $C_4H_{10}O$  on oxidation forms compound B. The compound B gives positive iodoform test and on reaction with  $CH_3MgBr$  followed by hydrolysis gives C. Identify A, B & C and also write the reactions involved.
8. A compound A reacts with thionyl chloride to give compound B. B reacts with Mg to form Grignard reagent which is treated with acetone and the is hydrolysed to give 2-Methyl butan-2-ol.
9. An organic compound A having molecular formula  $C_6H_6O$  gives a characteristic colour with aq.  $FeCl_3$  solution. When A is treated with  $CO_2$  & NaOH at 400 K. On acidification gives compound C, which reacts with acetyl chloride to form D which is a popular pain killer. Deduce the structures of A, B, C & D and also write the reactions involved.

10. An organic compound A  $C_2H_6O$  reacts with sodium to form a compound B with the evolution of  $H_2$  and gives a yellow compound C when treated with iodine & NaOH. When heated with conc.  $H_2SO_4$  at 413 K, it gives a compound D ( $C_4H_{10}O$ ) which on treatment with conc. HI at 373 K gives E. D is also obtained when B is heated with E. Deduce structure of A to E and also write the reactions involved.
11. A compound A  $C_8H_{10}O$  upon treatment with alkaline solution of iodine gives a yellow ppt. The filtrate on acidification gives a white solid B  $C_7H_6O_2$ . When B is treated with soda lime, C  $C_6H_6$  is obtained. Deduce the structure of A to C and also write the reactions involved.
12. An organic compound with molecular formula  $C_9H_{10}O$  forms 2,4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro reaction. On vigorous oxidation it gives 1,4-benzene dicarboxylic acid. Identify the compound and also write the reactions involved.
13. An organic compound A with molecular formula  $C_8H_8O$  forms an orange-red ppt. with 2,4-DNP reagent and gives yellow ppt. on heating with iodine in the presence of sodium hydroxide. It neither reduces Tollen's reagent or Fehling's solution, nor does it decolorise bromine water or Bayer's reagent. On drastic oxidation with chromic acid, it gives a carboxylic acid B having molecular formula  $C_7H_6O_2$ . Deduce the structure of A & B and also write the reactions involved.
14. An unknown aldehyde A on reacting with alkali gives a  $\beta$ -Hydroxy aldehyde, which loses water to form an unsaturated aldehyde, But-2-en-1-al. Another aldehyde B undergoes disproportionation reaction in the presence of conc. Alkali to form products C & D. C is an aryl alcohol with the formula  $C_7H_8O$ .
- Identify A & B
  - Write the sequence of reactions involved.
  - Name the product, when B reacts with Zn - Hg and HCl.
15. A compound X  $C_2H_4O$  on oxidation gives Y  $C_2H_4O_2$ . X undergoes haloform reaction. On treatment with HCN, X, forms a product Z which on hydrolysis gives 2-Hydroxy propanoic acid.
- Write down the structure of X & Y.
  - Name the product when X reacts with dil. NaOH.
  - Write down the equations for the reactions involved.
16. The compound A  $C_5H_{10}O$  forms phenyl hydrazone and gives negative Tollen's and iodoform test. Compound A on reduction gives n-Pentane. Identify the compound and also write the reactions involved.
17. The ketone A which undergoes haloform reaction gives compound B on reduction. B on heating with conc.  $H_2SO_4$  gives a compound C which forms ozonide D. D on hydrolysis in the presence of Zn dust gives only

- acetaldehyde. Identify the compounds A to D and also write the reactions involved.
18. An organic compound A ( $C_3H_6O$ ) is resistant to oxidation but forms compound B ( $C_3H_8O$ ) on reduction which reacts with HBr to form the bromide C. C forms a Grignard reagent which reacts with A to give D ( $C_6H_{14}O$ ). Identify the compounds A to D and also write the reactions involved.
  19. An alkene A on ozonolysis gives acetone and an aldehyde. The aldehyde is easily oxidized to an acid B. When B is treated with bromine in the presence of phosphorus, it yields compound C which upon hydrolysis gives a hydroxyl acid D. This acid can also be obtained from acetone by the reaction with hydrogen cyanide followed by hydrolysis. Identify the compounds A to D and also write the reactions involved.
  20. The compound A,  $C_5H_{10}O$  does not show Tollen's test. On reacting with  $C_2H_5MgBr$  followed by hydrolysis, the compound B,  $C_7H_{16}O$  was obtained. The dehydration of B yields C, which on ozonolysis give diethyl ketone and acetaldehyde. Identify the compounds A to C and also write the reactions involved.
  21. An organic compound with the molecular formula  $C_9H_{10}O$  forms 2,4 - DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro's reaction. On vigorous oxidation, it gives Benzene-1,2-dicarboxylic acid. Identify the compound and also write the reactions involved.
  22. An organic compound A  $C_8H_{16}O_2$  was hydrolysed with dilute sulphuric acid to give a carboxylic acid B and an alcohol C. Oxidation of C with chromic acid produced B. C on dehydration gives But-1-ene. Identify the compounds A to C and also write the reactions involved.
  23. An organic compound contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and give positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acid. Identify the compound and also write the reactions involved.
  24. Optically active amide A  $C_5H_{11}NO$  on acid hydrolysis gives an acid and ammonia. When A is treated with bromine and alkali, a compound is obtained which on treatment with nitrous acid gives an optically active alcohol and nitrogen. The alcohol gives positive iodoform test. Identify the compound A and also write the reactions involved.
  25. Compound A  $C_6H_{12}O_2$  on reduction with  $LiAlH_4$  yielded two compounds B & C. The compound B on oxidation gave D which on treatment with aq. KOH and subsequent heating furnished E. The later on catalytic hydrogenation gave C. The compound D was oxidized further to give F which was found to be

- monobasic acid (Molecular Mass = 60). Identify the compounds A to F and also write the reactions involved.
26. An organic compound A on treatment with ethyl alcohol gives a carboxylic acid B and a compound C. Hydrolysis of C under acidic conditions gives B and D. Oxidation of D with  $\text{KMnO}_4$  also gives B. B upon heating with  $\text{Ca}(\text{OH})_2$  gives E (Molecular Formula  $\text{C}_3\text{H}_6\text{O}$ ), E does not give Tollen's test and does not reduce Fehling's solution but forms 2,4 - DNP. Identify the compounds A to E and also write the reactions involved.
27. An aromatic compound A on treatment with aq.  $\text{NH}_3$  and heating forms compound B which on heating with  $\text{Br}_2$  and  $\text{KOH}$  forms a compound C of molecular formula  $\text{C}_6\text{H}_7\text{N}$ . Identify the compound A and also write the reactions involved.
28. An optically inactive compound A having molecular formula  $\text{C}_4\text{H}_{11}\text{N}$  on treatment with  $\text{HNO}_2$  gave an alcohol B. B on heating at 440 K gave an alkene C. C on treatment with  $\text{HBr}$  gave an optically active compound D having molecular formula  $\text{C}_4\text{H}_9\text{Br}$ . Identify the compounds A to D and also write the reactions involved.
29. Suggest a structural formula of a compound having molecular formula  $\text{C}_8\text{H}_{11}\text{N}$  (A) which is optically active, dissolves in dil.  $\text{HCl}$  and releases  $\text{N}_2$  with Nitrous acid. Identify the compounds A and also write the reactions involved.
30. A colourless substance A is sparingly soluble in water and gives B on heating with mineral acid ( $\text{HCl}$ ). Compound B on reaction with  $\text{CHCl}_3$  and alcoholic potash produces an obnoxious smell of carbonylamine due to the formation of C. Compound A on reaction with chlorosulphonic acid gives D which on treatment with  $\text{NH}_3$  gives E. Compound E on hydrolysis gives sulphanilamide, a well known drug. Identify the compounds A to E and also write the reactions involved.
31. An organic compound A ( $\text{C}_3\text{H}_5\text{N}$ ) on boiling with alkali gives ammonia and sodium salt of an acid B ( $\text{C}_3\text{H}_6\text{O}_2$ ). A on reduction gives C ( $\text{C}_3\text{H}_9\text{N}$ ) with which nitrous acid gives D ( $\text{C}_3\text{H}_8\text{O}$ ). Identify the compounds A to D and also write the reactions involved.
32. An organic compound A having molecular formula ( $\text{C}_2\text{H}_3\text{N}$ ) on reduction gave another compound B. Upon treatment with nitrous acid, B gave ethyl alcohol and on warming with chloroform and alcoholic  $\text{KOH}$ , it formed an offensive smelling compound C. Identify the compounds A to C and also write the reactions involved.
33. Compound A ( $\text{C}_4\text{H}_{10}\text{O}$ ) reacts rapidly with sodium metal but undergoes no reaction with Lucas's reagent at room temperature. It reacts with hot conc.  $\text{H}_2\text{SO}_4$  to give B ( $\text{C}_4\text{H}_8$ ). Compound B undergoes hydration with dil.  $\text{H}_2\text{SO}_4$  to give C ( $\text{C}_4\text{H}_9\text{OH}$ ). Compound C reacts rapidly with Lucas reagent. Identify the compounds A to C and also write the reactions involved.

34. An organic compound A ( $C_4H_9OH$ ) reacts with HI giving a compound B ( $C_4H_9I$ ) which on reduction gives a normal hydrocarbon having four carbon atoms. On oxidation, A gives compound C ( $C_4H_8O$ ) and then an acid D. Identify the compounds A to D and also write the reactions involved.
35. An organic acid A ( $C_5H_{10}O_2$ ) reacts with  $Br_2$  in the presence of phosphorous to give B. Compound B contains an asymmetric carbon atom and yields C on dehydrobromination. Compound C does not show geometrical isomerisation and on decarboxylation gives an alkene D which upon ozonolysis gives E & F. Compound E gives positive Schiff's test but F does not. Identify the compounds A to F and also write the reactions involved.
36. An organic compound A ( $C_5H_8O_3$ ) on heating with soda lime gives B, which reacts with HCN to give C. The compound C reacts with thionyl chloride to produce D which on reaction with KCN gives compound E. Alkaline hydrolysis of E gives a salt F which on heating with sodalime produced n-Butane. Careful oxidation of A with Potassium dichromate gives acetic acid and malonic acid. Identify the compounds A to F and also write the reactions involved.
37. An organic compound A reacted with dilute  $H_2SO_4$  to give a compound B which is optically inactive. B on reaction with sodium formed a compound C. C when reacted with  $CH_3Br$ , formed a compound D ( $C_5H_{12}O$ ). Identify compounds A, B, C and D & write the reaction involved.
38. A organic compound A has 76.6% carbon, 6.38% hydrogen and rest is oxygen. Its molecular mass is 94 u. It gives characteristic color with aqueous  $FeCl_3$  solution. A when treated with  $CO_2$  and NaOH at 400K under 4-7 atm pressure gives B, which on being acidified gives C. C reacts with acetyl chloride to give D which is an well known pain killer. Identify compounds A, B, C and D & write the reaction involved.