

HYDROCARBONS

- Write the reactions for the preparations of butane by :
 - Wurtz reaction
 - Kolbe's reaction
- Why Wurtz reaction is not preferred for the preparation of alkanes containing odd number of carbon atoms? Illustrate
- Write the structure and names of products obtained in the reactions of sodium with a mixture of 1-iodo-2-methylpropane and 2-iodopropane.
- Write the hydrocarbon radicals that can be formed as intermediates during monochlorination of 2-methylpropane. Which of them is more stable?
- An alkane C_8H_{18} is obtained as the only product on subjecting a primary alkyl halide to Wurtz reaction. On monobromination this alkane yields a single isomer of a tertiary bromide. Write the structure of alkane and the tertiary bromide.
- Give the structure of the alkene (C_4H_8) which adds on HBr in the presence and in absence of peroxide to give the same compounds.
- Which of the two trans-but-2-ene or trans-pent-2-ene is non-polar?
- Write an equation of the reaction of propyne with water in the presence of H_2SO_4 and $HgSO_4$. Show the intermediate.
- How would you distinguish between
 - But-1-yne and but-2-yne
 - Propene and propyne
- A hydrocarbon containing two double bonds on reductive ozonolysis produces glyoxal, ethanol and propanone. Predict the structure of the hydrocarbon and also give its IUPAC name.
- List the following alkenes in decreasing order of reactivity towards electrophilic addition.
 - $ClCH_2CH=CH_2$
 - $(CH_3)_2C=CH_2$
 - $CH_3CH=CH_2$
 - $CH_2=CHCl$
- Nucleophiles and electrophiles are reaction intermediates having electron rich and electron deficient centres respectively. Hence they tend to attack electron deficient and electron rich centres respectively. Classify the following species as electrophiles and nucleophiles.

i) CH_3CO^-	v) $(CH_3)_3C^+$
ii) $CH_3-\overset{O}{\parallel}C-O^-$	vi) Br^-
iii) \dot{Cl}	vii) H_3COH
iv) $Cl_2C:$	viii) $R-NH-R$
- Complete the following reactions:
 - iso-propyl bromide $\xrightarrow[\text{Heat}]{\text{alc. KOH}}$ A $\xrightarrow[\text{peroxide}]{\text{HBr}}$ B
 - n-propyl alcohol $\xrightarrow[443\text{ K}]{\text{conc. } H_2SO_4}$ A
- An alkene contains three C-C σ bonds, eight C-H σ and one C-C pi bond. A on ozonolysis gives two moles of an aldehyde of molar mass 44 u. Write IUPAC name of A.
- Predict the major product (s) of the following reactions

$$CH_3-CH=CH_2 \xrightarrow[HBr]{(Ph-CO-O)_2}$$

16. An alkyl halide (X) of formula $C_6H_{13}Cl$ on treatment with alcoholic KOH or potassium ter-butoxide gives two isomeric alkenes (Y) and (Z) (C_6H_{12}). Both alkenes on hydrogenation give 2,3-dimethylbutane. Predict the structure of X, Y and Z.
17. 2-methyl propan-2-ol is obtained by the reaction of X with water in the presence of conc. H_2SO_4 . Then write the name of compound X.
18. Write the products for the following reaction:
- a) $CH_3-CH=CH_2 + H_2O + O \xrightarrow[273\text{ K}]{\text{dil KMnO}_4}$
- b) $CH_3-CH=CH_2 \xrightarrow[H^+]{KMnO_4}$
19. The hydrocarbon A adds one mole of hydrogen in the presence of a platinum catalyst to form n-hexane. When A is oxidized vigorously with $KMnO_4$, a single carboxylic acid containing three carbon atoms is isolated. Give the structure of A and write whole reaction.
20. Suggest a route for the preparation of p-chloronitrobenzene starting from acetylene.
21. Arrange the following sets of compounds in order of their decreasing relative reactivity with an electrophile.
- a) chlorobenzene, 2,4-dinitrobenzene, p-nitrochlorobenzene
- b) Toluene, p- $H_3C-C_6H_4-NO_2$, p- $O_2N-C_6H_4-NO_2$
22. 7-bromo-1,3,5-cycloheptatriene exist as an ion whereas 5-bromo-1,3-cyclopentadiene does not form an ion even in presence of Ag^+ . Explain
23. How will you convert benzene into:
- a) m-nitrochlorobenzene
- b) acetophenone

c) p-nitrotoluene.

24. An alkyne (X) has molecular formula C_5H_8 . It reacts neither with sodamide nor with ammonical cuprous chloride.
25. How would you convert benzoic acid to benzene?

JUST READ AND UNDERSTAND

- Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitutions with difficulty?
Ans: Due to the presence of delocalized 6π electrons. So, it attracts the electrophilic reagent (electron deficient species) towards itself but repels the nucleophilic reagents. That's why benzene gives electrophilic substitution reaction easily and nucleophilic substitution reaction with difficulty.
- Despite their $-I$, Halogens are ortho and para directing in haloarenes. Explain.
Ans: Halogens are moderately deactivating group. Because of their strong $-I$ effect, overall electron density on benzene ring decreases. However, due to resonance the electron density on ortho and para positions is greater than at meta position. Hence, they are also ortho and para directing groups.
- Why do alkenes prefer to undergo electrophilic addition reaction while arenes prefer electrophilic substitution reactions? Explain.
Ans: Alkenes are rich source of loosely held π electrons, due to which they show electrophilic addition reaction. Electrophilic addition reactions of alkene are accompanied by large energy changes so these are energetically favorable than that of electrophilic substitution reactions. In special conditions alkenes also undergo free radical substitution reaction.
 In arenes during electrophilic addition reactions aromatic character of benzene ring is destroyed while during substitution reaction it remains intact. Electrophilic substitution reactions of arene are energetically more favorable than that of electrophilic addition reaction.