

HYDROCARBONS

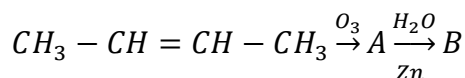
1) Which of the following deactivates benzene towards further substitution reaction?

- 1) – OR 2) – OH 3) – NHR 4) – COOR

Sol.:(4)

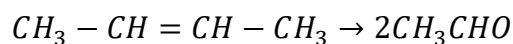
Due to strong –R effect, –COOR is deactivation group, while all others are activating groups. Recall that all m-directing groups are deactivating groups.

2) The following sequence of reactions, the alkene which gives compound B



- 1) acetone 2) propanal 3) prop-2-ene 4) Acetaldehyde

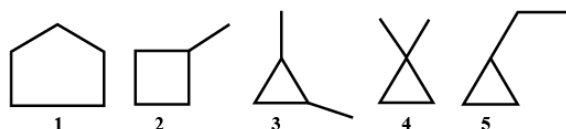
Sol.:(4)



3) The total number of cyclic structural and stereo isomers possible for a compound with molecular formula C₅H₁₀ is

- 1) 5 2) 4 3) 7 4) 6

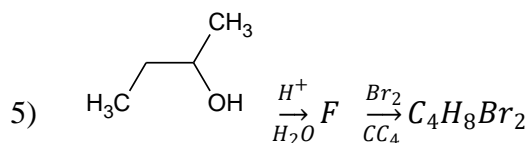
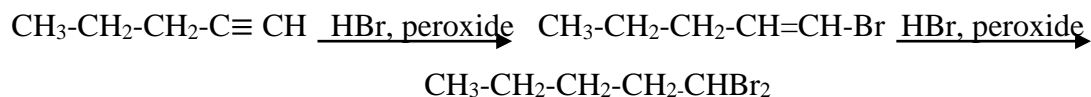
Sol.:(3); For 3rd structure, 2 cis-trans and 1 optical isomer are possible.
Hence total no. = 7



4) Predict the product of the reaction of 1-pentyne and excess HBr in the presence of hydrogen peroxide.

- 1) 1, 1-dibromopentane 2) 1,2-dibromopentane
3) 2-bromo-1-pentane 4) 2,2-dibromopentane

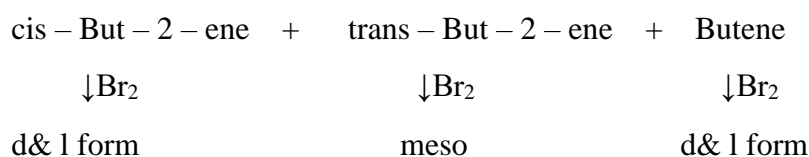
Sol.: (1)



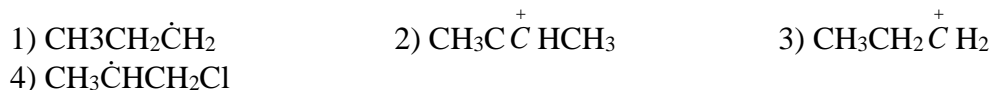
[5 such products are possible] How many structures of F are possible?

- 1) 2 2) 3 3) 5 4) 6

Sol.: (2)



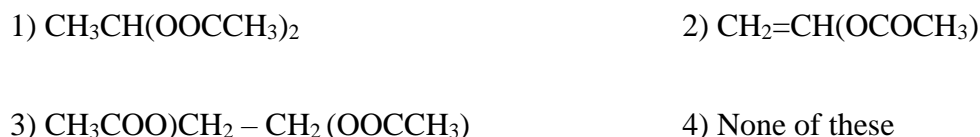
6) The intermediate during the addition of HCl to propene in the presence of peroxide is



Sol.:(2)

Peroxide effect (where free-radicals are formed) is observed only in addition of HBr; addition of HCl is an ionic reaction and thus CH₃C⁺ĊHCH₃ (2^o carbocation) is formed as an intermediate.

7) Excess of CH₃COOH is reacted with CH≡ CH in presence of Hg⁺², the product is



Sol.:(1)



8) A hydrocarbon X adds on one mole of hydrogen to give another hydrocarbon and decolourised bromine water. X reacts KMnO₄ in presence of acid to give two mole of the same carboxylic acid. The structure of X is:



Sol.: (1)

Symmetrical alkenes on oxidation give same product.

9) The maximum number of isomers for an alkane with the molecular formula C₅H₁₂ is



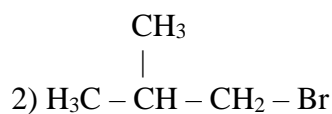
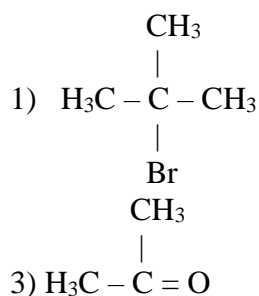
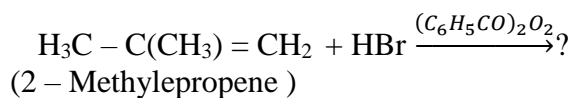
Sol.:(3)

n-pentane

2-methyle butane

2, 2-Dimethylepropane

10) What will be the major product of the following reaction?



4) All of these

Sol.:(2) AntiMarkownikoffs addition reaction.

11) Which gives only one mono substituted product on chlorination ?

- 1) N - Butane 2) n - Pentane 3) Iso - Pentane 4) Neo - Pentane

Sol.:(4)

All H - atoms are equivalent and so will produce only one mono-substitution product.

12) To prepare a pure sample of n-hexane using sodium metal as one reactant, the other reactant will be

- 1) n-Propyl bromide 2) Methyl bromide and n-pentyl bromide
3) Ethyl chloride and n-butylchloride 4) Ethyl bromide and n-butyl bromide

Sol.:(1)

13) Benzene on ozonolysis gives

- 1) BHC 2) cyclohexane 3) ethanedial 4) Both (1) and (2)

Sol.:(3)

(Glyoxal) 3CHO - CHO

14) In the Nitration of benzene and conc. HNO_3 and conc. H_2SO_4 the electrophile is

- 1) NO_2 2) NO 3) NO_2^+ 4) NO_2^-

Sol.:(3)



Acid Base

15) During chlorination of methane usually a mixture of all the chlorinated products, i.e., methyl chloride, methylene dichloride, chloroform and carbon tetrachloride are obtained. What will happen, if we use excess of Cl_2 in this reaction?

- 1) Only methyl chloride will be formed
formed
- 2) Only chloroform will be formed
- 3) Only methylene dichloride will be formed
- 4) Only CCl_4 will be formed

Sol.: (4)

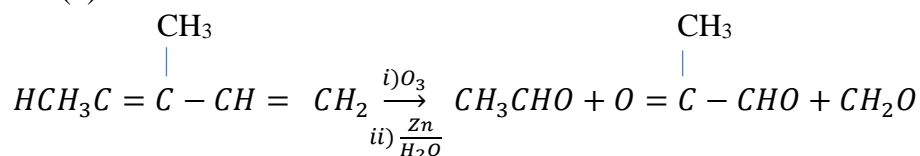
Excess of Cl_2 finally converts all products to CCl_4 .

16) Which set of products is expected on reductive ozonolysis of the following diolefin?



- 1) CH_3CHO ; CH_3COCH_3 ; CH_2O
- 2) $\text{CH}_3\text{HC}=\text{C}(\text{CH}_3)-\text{CHO}$, CH_2O
- 3) CH_3CHO ; CH_3COCHO ; CH_2O
- 4) CH_3CHO ; $\text{CH}_3\text{COCH}=\text{CH}_2$

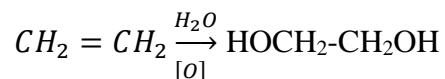
Sol.: (3)



17) Ethylene reacts with Baeyers reagent i.e. 1% alkaline KMnO_4 solution to give

- 1) Glycerol
- 2) Alcohols
- 3) Glycol
- 4) None

Sol.: (3)



18) Which one of the following compound will exhibit geometrical isomerism?

- 1) 1-phenyl-2-butene
- 2) 1,1-diphenyl-1-propene
- 3) 2-phenyl-1-butene
- 4) 3-phenyl-1-butene

Sol.: (1)

Alkenes to show geometrical isomerism they should contain carbon double bond and each carbon atom should have two different groups attached to it.

19) 2.8 g of pure alkene containing only one double bond per molecule, react completely with 8g of bromine (in an inert solvent). What is the molecular formula of the alkene?

- 1) C_3H_4
- 2) C_2H_4
- 3) C_6H_{12}
- 4) C_4H_8

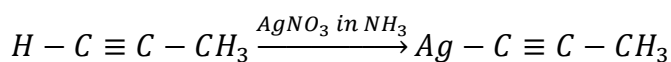
Sol.: (4)

8g Br₂ reacts with 2.8g of alkene. Therefore 160g of Br₂ reacts with 56g of alkene. Thus the molecular weight of alkene is 56 which indicate C₄H₈.

20) Propyne and propene can be distinguished by

- | | |
|---|---|
| 1) Br ₂ and CCl ₄ | 2) AgNO ₃ in ammonia |
| 3) Dil. KMnO ₄ | 4) Conc. H ₂ SO ₄ |

Sol.: (2)



Since Terminal H – atoms are acidic in nature.

21) Which of the following are o, p-directing groups?

- | | |
|------------|-------------------|
| 1) Toluene | 2) Nitrobenzene |
| 3) Aniline | 4) Both (1) & (3) |

Sol.:(4)

Toluene and aniline are o, p-directing groups.

22) The product which will not formed when ethane reacts with chlorine in the presence of diffused sunlight

- | | |
|--------------------------|------------|
| 1) Ethylene dichloride | 2) propane |
| 3) ethylidene dichloride | 4) butane |

Sol.: (2)

The reaction proceeds through free radical mechanism. In the presence of diffused sunlight the radical formed combine to form butane

23) The synthesis of oct-3-yne is achieved by adding a bromoalkane into a mixture of sodium amide and alkyne. The bromoalkane and alkyne respectively are

- 1) BrCH₂CH₂CH₂CH₂CH₃ and CH₃C≡CH
- 2) BrCH₂CH₂CH₂CH₂CH₃ and CH₃CH₂C≡CH
- 3) BrCH₂CH₂CH₃ and CH₃CH₂C≡CH
- 4) BrCH₂CH₂CH₂CH₃ and CH₃CH₂C≡CH

Sol.: (4)



24) Which of the following is anti aromatic?

- | | |
|-------------------------|-------------------------------|
| 1) Cyclopropenyl cation | 2) Cycloheptatriene |
| 3) Phenanthrene | 4) Cyclooctatetraenyl dianion |

Sol.: (2)

It has 6π – electrons, but it is non-planar. Hence it is anti aromatic.

25) Arrange the following compounds in decreasing order of reactivity towards the addition of HBr $RCH=CHR$, $CH_2=CH_2$, $R_2C=CHR$, $R_2C=CR_2$

- 1) $RCH=CHR < R_2C=CR_2 < R_2C=CHR < CH_2=CH_2$
- 2) $CH_2=CH_2 < RCH=CHR < R_2C=CHR < R_2C=CR_2$
- 3) $R_2C=CHR < RCH=CHR < CH_2=CH_2 < R_2C=CR_2$
- 4) $R_2C=CR_2 < R_2C=CHR < RCH=CHR < CH_2=CH_2$

Sol.: (2)

$CH_2=CH_2 < RCH=CHR < R_2C=CHR < R_2C=CR_2$ (no+ I group) (two+ I group)(three + I group) (four+ I group)

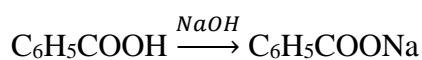
26) In the reaction

Toluene $\xrightarrow{[O]}$ A \xrightarrow{NaOH} B $\xrightarrow{NaOH/CaO}$ C. The product C is

- | | | | |
|-------------|---------------|----------------|------------------|
| 1) C_6H_6 | 2) C_6H_5OH | 3) C_6H_5ONa | 4) C_6H_5COONa |
|-------------|---------------|----------------|------------------|

Sol.: (1)

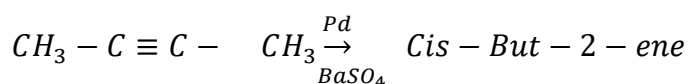
Toluene \rightarrow Benzoic acid (C_6H_5COOH)



27) When 2-Butyne is treated with Pd-BaSO₄ deactivated with Quinoline the product formed will be

- | | |
|---------------------|-------------------|
| 1) 1-Butene | 2) Cis-But-2ene |
| 3) 2-hydroxy butane | 4) trans-2-Butene |

Sol.:(2)



Lindlars catalyst

28) On halogenation, an alkane (C_5H_{12}) gives only one mono substituted product. The alkane is

- | | |
|-------------------------|-----------------|
| 1) 2,2-dimethyl propane | 2) cyclopentane |
| 3) 2-methyl butane | 4) n-Pentane |

Sol.: (1)

2, 2-dimethyl propane is also called neopentane. It gives only one monosubstituted product.

29) Two gases. P and Q decolourise aqueous bromine but only one of them gives a white precipitate with aqueous ammonical silver nitrate solution. P and Q are likely to be

- | | |
|-----------------------------|-----------------------|
| 1) ethane and but-2-yne | 2) ethyne and propyne |
| 3) But -1-yne and but-2-yne | 4) ethane and ethyne |

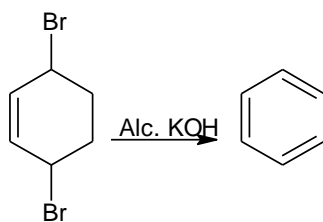
Sol.: (3)

Since both gases decolourises $KMnO_4$ solution, both must be unsaturated, i.e. alkene (option 2 or 3). However, only one of them gives a white precipitate with ammonical $AgNO_3$ solution, it must be terminal alkyne and thus the other should be either be a non-terminal alkyne or an alkene. The data coincide with the option (3)

30) The product formed when 1, 4-dibromocyclohex-2-ene is heated with alcoholic potash

- | | |
|--------------------------|-------------------------------|
| 1) benzene | 2) 1-Bromo-2,4-cyclohexadiene |
| 3) 1-Bromocyclohex-2-ene | 4) 1,4-dibromobenzene |

Sol.: (1)

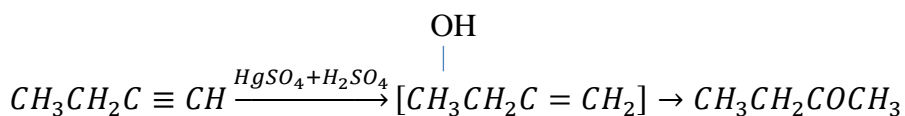


31) The products obtained via oxymercuration ($HgSO_4+H_2SO_4$) of 1-butyne would be

- | | |
|-------------------------------|-------------------------------|
| 1) $CH_3 - CH_2 - CO - CH_3$ | 2) $CH_3 CH_2 COOH + HCOOH$ |
| 3) $CH_3 - CH_2 - CHO + HCHO$ | 4) $CH_3 - CH_2 - CH_2 - CHO$ |

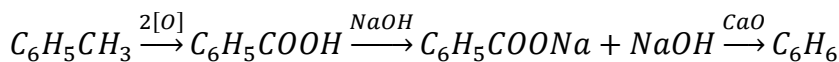
Sol.: (1)

Oxymercuration leads to hydration in Markovnikov's manner



- 37) In the reaction, $C_6H_5CH_3 \xrightarrow{\text{oxidation}} A \xrightarrow{NaOH} B \xrightarrow[\Delta]{\text{sodalime}} C$ The product C is
- 1) C_6H_5COONa 2) C_6H_6 3) C_6H_5OH 4) C_6H_5ONa

Sol.: (2)



- 38) Which of the following compounds cannot be prepared by Kolbes electrolytic method?

- 1) Propane 2) Butane 3) Ethane 4) None

Sol.: (1)

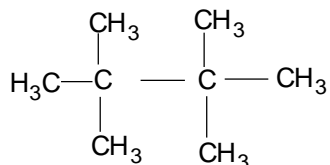
Propane cannot be prepared by Kolbes electrolytic method as this method is used to prepare only alkanes with even number of carbon atoms.

- 39) A hydrocarbon with molecular formula C_8H_{18} gives only one monochloro derivative. The hydrocarbon is

- 1) 2-Methylheptane 2) 2, 2, 4-Trimethylpentane
3) 2,2,3,3-Tetramethylbutane 4) n-Octane

Sol.:(3)

Since the hydrocarbon C_8H_{18} gives only one monochloroderivative, its all 18 hydrogen atoms are equivalent, which is possible only in case of 2,2,3,3-tetramethylbutane.



- 40) When $CH_2=CH-COOH$ is reduced with $LiAlH_4$, the compound obtained will be

- 1) CH_3-CH_2-COOH 2) $CH_3-CH_2-CH_2OH$
3) CH_3-CH_2-CHO 4) $CH_2=CH-CH_2OH$

Sol.: (4)

- 41) $A \xleftarrow{\text{Lindlars catalyst}} CH_3-C \equiv C-CH_3 \xrightarrow[\text{liq.}NH_3]{Na \text{ in}} B$, A & B are respectively

- 1) cis, trans - 2 - butene 2) trans, cis - 2 - butene
3) both cis - 2 - butene 4) both trans - 2 - butene

Sol.:(1)

