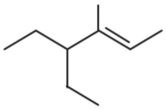
CHAPTER

22

Hydrocarbons

1. The *trans*-alkene are formed by the reduction of alkynes with
   (a) H_2, Pd/C, $BaSO_4$ (b) $NaBH_4$
   (c) Na/liq. NH_3 (d) Sn/HCl *(2018)*

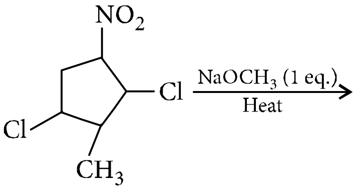
2. The IUPAC name of the following compound is



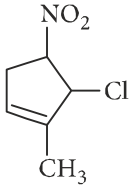
   (a) 4-methyl-3-ethylhex-4-ene
   (b) 4,4-diethyl-3-methylbut-2-ene
   (c) 3-ethyl-4-methylhex-4-ene
   (d) 4-ethyl-3-methylhex-2-ene. *(Online 2018)*

3. When 2-butyne is treated with H_2/Lindlar's catalyst, compound X is produced as the major product and when treated with Na/liq. NH_3 it produces Y as the major product. Which of the following statements is correct?
   (a) Y will have higher dipole moment and higher boiling point than X.
   (b) X will have higher dipole moment and higher boiling point than Y.
   (c) X will have lower dipole moment and lower boiling point than Y.
   (d) Y will have higher dipole moment and lower boiling point than X.
   (Online 2018)

4. The major product formed in the following reaction is



(a)



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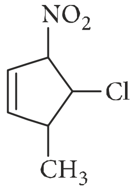
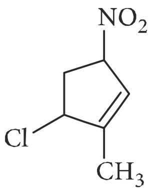
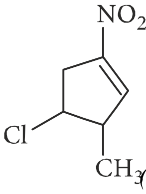


(c)

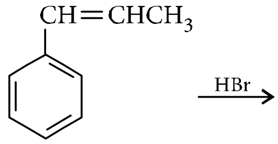


(d)

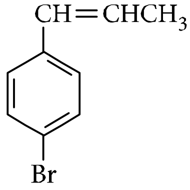


(Online 2018)

5. The major product of the following reaction is



(a)



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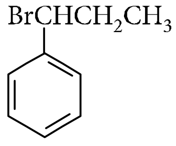

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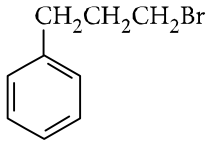

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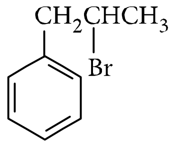
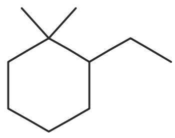


(Online 2018)

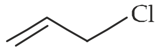
6. The IUPAC name of the following compound is



   (a) 1-ethyl-2, 2-dimethylcyclohexane
   (b) 2, 2-dimethyl-1-ethylcyclohexane
   (c) 1, 1-dimethyl-2-ethylcyclohexane
   (d) 2-ethyl-1, 1-dimethylcyclohexane. *(Online 2017)*

7. Which of the following compounds will not undergo Friedel-Crafts reaction with benzene?

(a)



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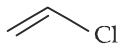

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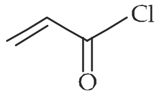
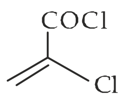
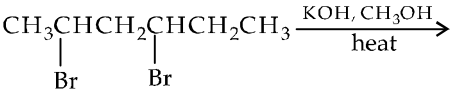


(d)



(Online 2017)

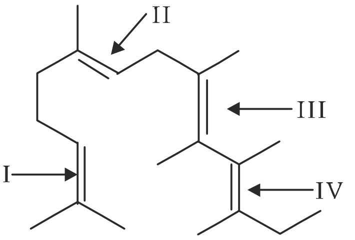
8. The major product of the following reaction is



$$CH_3\underset{\text{Br}}{\underset{|}{C}}HCH_2\underset{\text{Br}}{\underset{|}{C}}HCH_2CH_3 \xrightarrow[\text{heat}]{\text{KOH, }CH_3OH}$$

   (a) $CH_2 = CHCH = CHCH_2CH_3$
   (b) $CH_2 = CHCH_2CH = CHCH_3$
   (c) $CH_3CH = CH - CH = CHCH_3$
   (d) $CH_3CH = C = CHCH_2CH_3$ *(Online 2017)*

9. In the following structure, the double bonds are marked as I, II, III and IV:

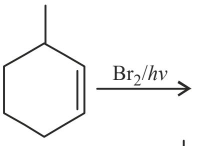


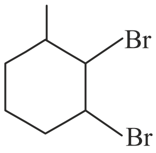
Geometrical isomerism is not possible at site(s)

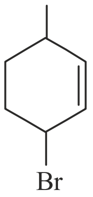
(a) I (b) III

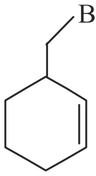
(c) I and III (d) III and IV *(Online 2017)*

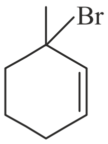
10. The major product of the following reaction is



(a) 

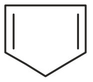
(b) 

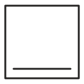
(c) 

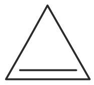
(d) 

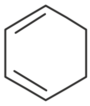
Online 2017)

11. Which of the following compounds is most reactive to an aqueous solution of sodium carbonate?

(a) 

(b) 

(c) 

(d)  *(Online 2017)*

12. The reaction of propene with HOCl (Cl_2 + H_2O) proceeds through the intermediate :

(a) $CH_3 — CH^+ — CH_2 — OH$

(b) $CH_3 — CH^+ — CH_2 — Cl$

(c) $CH_3 — CH(OH) — \overset{+}{C}H_2$

(d) $CH_3 — CHCl — \overset{+}{C}H_2$ *(2016)*

13. The gas evolved on heating CH_3MgBr in methanol is

(a) methane (b) ethane

(c) propane (d) HBr *(Online 2016)*

14. The hydrocarbon with seven carbon atoms containing a neopentyl and a vinyl group is

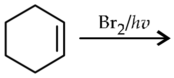
(a) 2, 2-dimethyl-4-pentene

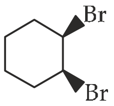
(b) 4, 4-dimethylpentene

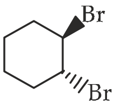
(c) isopropyl-2-butene

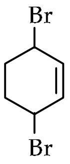
(d) 2, 2-dimethyl-3-pentene *(Online 2016)*

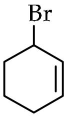
15. Bromination of cyclohexene under conditions given below yields



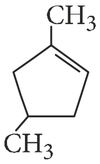
(a) 

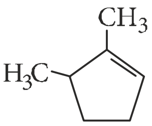
(b) 

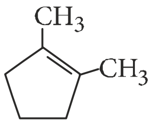
(c) 

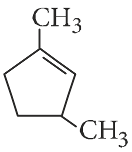
(d)  *(Online 2016)*

16. Which compound would give 5-keto-2-methyl-hexanal upon ozonolysis?

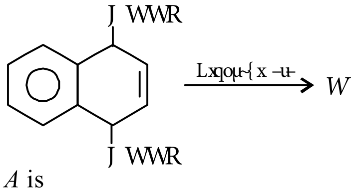
(a) 

(b) 

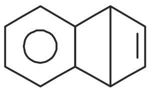
(c) 

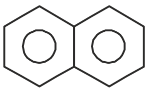
(d) 

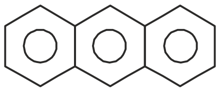
(2015)

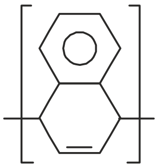
17. 

A is

(a) 

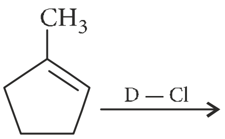
(b) 

(c) 

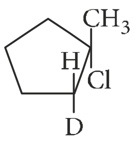
(d) 

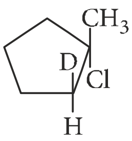
(Online 2015)

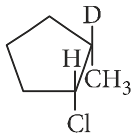
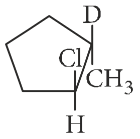
18. What is the major product expected from the following reaction?



Where D is an isotope of hydrogen.

(a) 

(b) 

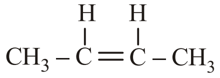
(c)  (d)  *(Online 2015)*

19. A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO_2. The empirical formula of the hydrocarbon is
(a) C_7H_8 (b) C_2H_4
(c) C_3H_4 (d) C_6H_5 *(2013)*

20. Which branched chain isomer of the hydrocarbon with molecular mass 72 u gives only one isomer of mono substituted alkyl halide?
(a) Neopentane (b) Isohexane
(c) Neohexane (d) Tertiary butyl chloride *(2012)*

21. 2-Hexyne gives *trans*-2-hexene on treatment with
(a) Li/NH_3 (b) $Pd/BaSO_4$
(c) $LiAlH_4$ (d) Pt/H_2 *(2012)*

22. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is
(a) ethene (b) propene
(c) 1-butene (d) 2-butene. *(2010)*

23. The treatment of CH_3MgX with $CH_3C \equiv C - H$ produces
(a) CH_4
(b) $CH_3 - CH = CH_2$
(c) $CH_3C \equiv C - CH_3$
(d) 
$CH_3 - \overset{\overset{H}{|}}{C} = \overset{\overset{H}{|}}{C} - CH_3$ *(2008)*

24. The hydrocarbon which can react with sodium in liquid ammonia is
(a) $CH_3CH_2C \equiv CCH_2CH_3$
(b) $CH_3CH_2CH_2C \equiv CCH_2CH_2CH_3$
(c) $CH_3CH_2C \equiv CH$
(d) $CH_3CH = CHCH_3$ *(2008)*

25. In the following sequence of reactions, the alkene affords the compound *B*

$$CH_3CH = CHCH_3 \xrightarrow{O_3} A \xrightarrow[Zn]{H_2O} B.$$

The compound *B* is
(a) CH_3CHO (b) CH_3CH_2CHO
(c) CH_3COCH_3 (d) $CH_3CH_2COCH_3$ *(2008)*

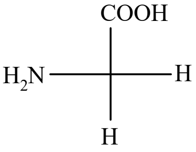
26. Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains
(a) mixture of *o*- and *m*-bromotoluenes
(b) mixture of *o*- and *p*-bromotoluenes
(c) mixture of *o*- and *p*-dibromobenzenes
(d) mixture of *o*- and *p*-bromoanilines. *(2008)*

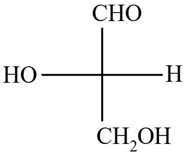
27. Presence of a nitro group in a benzene ring
(a) deactivates the ring towards electrophilic substitution
(b) activates the ring towards electrophilic substitution
(c) renders the ring basic
(d) deactivates the ring towards nucleophilic substitution. *(2007)*

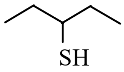
28. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives predominantly
(a) *m*-chlorobenzene (b) benzoyl chloride
(c) benzyl chloride
(d) *o*- and *p*-chlorotoluene. *(2007)*

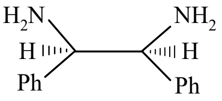
29. Which of the following reactions will yield 2,2-dibromopropane?
(a) $CH_3 - CH = CH_2 + HBr \rightarrow$
(b) $CH_3 - C \equiv CH + 2HBr \rightarrow$
(c) $CH_3CH = CHBr + HBr \rightarrow$
(d) $CH \equiv CH + 2HBr \rightarrow$ *(2007)*

30. Which of the following molecules is expected to rotate the plane-polarised light?

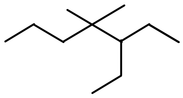
(a) 

(b) 

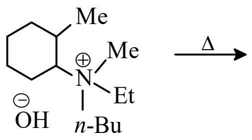
(c) 

(d) 

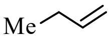
(2007)

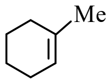
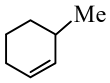
31. The IUPAC name of  is
(a) 3-ethyl-4-4-dimethylheptane
(b) 1,1-diethyl-2,2-dimethylpentane
(c) 4,4-dimethyl-5,5-diethylpentane
(d) 5,5-diethyl-4,4-dimethylpentane. *(2007)*

32. The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is
(a) benzyl alcohol (b) benzophenone
(c) acetophenone (d) benzoic acid. *(2007)*

33. 

The alkene formed as a major product in the above elimination reaction is

(a)  (b) $CH_2 = CH_2$

(c)  (d)  *(2006)*

34. Acid catalyzed hydration of alkenes except ethene leads to the formation of
(a) primary alcohol
(b) secondary or tertiary alcohol
(c) mixture of primary and secondary alcohols
(d) mixture of secondary and tertiary alcohols. *(2005)*

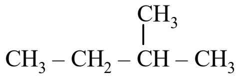
35. Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is
(a) *n*-hexane (b) 2,3-dimethylbutane
(c) 2,2-dimethylbutane (d) 2-methylpentane. *(2005)*

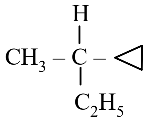
36. Reaction of one molecule of HBr with one molecule of 1, 3-butadiene at 40°C gives predominantly
(a) 3-bromobutene under kinetically controlled conditions
(b) 1-bromo-2-butene under thermodynamically controlled conditions
(c) 3-bromobutene under thermodynamically controlled conditions
(d) 1-bromo-2-butene under kinetically controlled conditions.
(2005)

37. 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly
(a) 1-bromo-2-methylbutane
(b) 2-bromo-2-methylbutane
(c) 2-bromo-3-methylbutane
(d) 1-bromo-3-methylbutane. *(2005)*

38. Which one of the following is reduced with zinc and hydrochloric acid to give the corresponding hydrocarbon?
(a) Ethyl acetate (b) Acetic acid
(c) Acetamide (d) Butan-2-one *(2004)*

39. Amongst the following compounds, the optically active alkane having lowest molecular mass is
(a) $CH_3 - CH_2 - CH_2 - CH_3$

(b) 
$CH_3 - CH_2 - \overset{CH_3}{\overset{|}{C}H} - CH_3$

(c) 

(d) $CH_3 - CH_2 - C \equiv CH$ *(2004)*

40. Which one of the following has the minimum boiling point?
(a) *n*-Butane (b) 1-Butyne
(c) 1-Butene (d) Isobutene *(2004)*

41. On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane could be
(a) propane (b) pentane
(c) isopentane (d) neopentane. *(2003)*

42. Butene-1 may be converted to butane by reaction with
(a) Zn - HCl (b) Sn - HCl
(c) Zn - Hg (d) Pd/H_2. *(2003)*

43. What is the product when acetylene reacts with hypochlorous acid?
(a) CH_3COCl (b) $ClCH_2CHO$
(c) Cl_2CHCHO (d) ClCHCOOH. *(2002)*

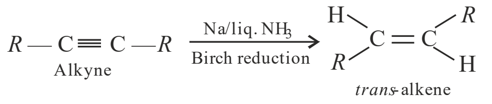
44. Which of these will not react with acetylene?
(a) NaOH (b) Ammonical $AgNO_3$
(c) Na (d) HCl *(2002)*

ANSWER KEY

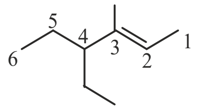
1. (c)	**2.** (d)	**3.** (b)	**4.** (d)	**5.** (b)	**6.** (d)	**7.** (b)	**8.** (c)	**9.** (a)	**10.** (d)	**11.** (a)	**12.** (b)
13. (a)	**14.** (b)	**15.** (d)	**16.** (d)	**17.** (b)	**18.** (b)	**19.** (a)	**20.** (a)	**21.** (a, c)	**22.** (d)	**23.** (a)	**24.** (c)
25. (a)	**26.** (b)	**27.** (a)	**28.** (d)	**29.** (b)	**30.** (b)	**31.** (a)	**32.** (d)	**33.** (d)	**34.** (b)	**35.** (b)	**36.** (b)
37. (b)	**38.** (d)	**39.** (c)	**40.** (d)	**41.** (d)	**42.** (d)	**43.** (c)	**44.** (a)				

Explanations

1. (c) :

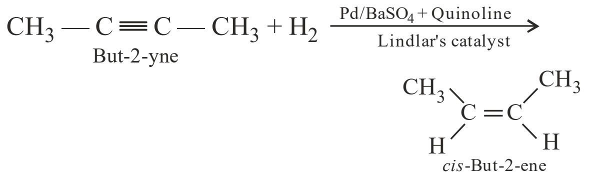


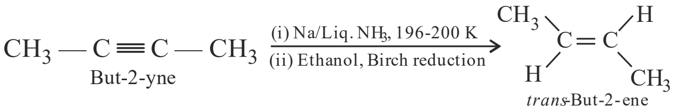
2. (d) :



IUPAC name : 4-Ethyl-3-methylhex-2-ene

3. (b) :

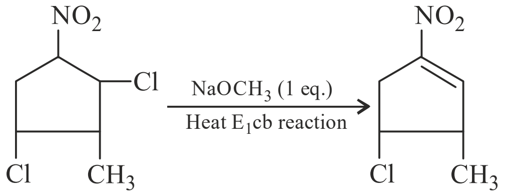




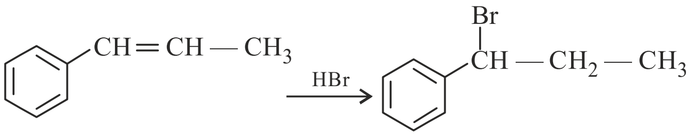
Dipole moment of $Y = 0$

X has higher dipole moment and higher boiling point than Y.

4. (d) :

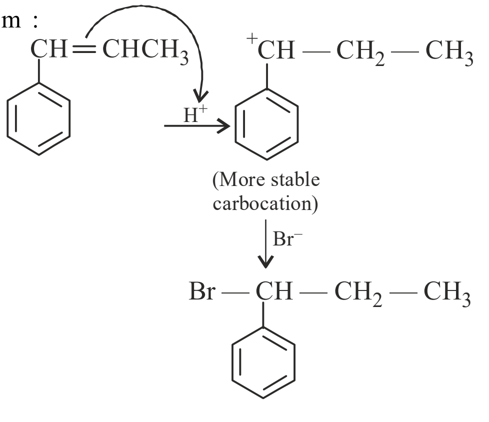


5. (b) :

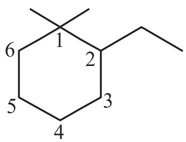


This is unimolecular nucleophilic substitution reaction (S_N1). This proceeds via the formation of carbocation and stability of carbocation is considered.

Mechanism :



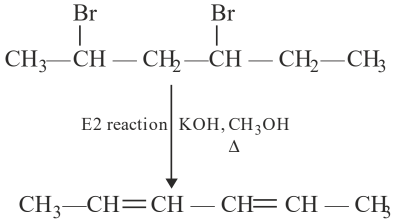
6. (d) :



2-Ethyl-1,1-dimethylcyclohexane

7. (b) : Formation of more stable carbocation is the condition for Friedel-Crafts reaction which is not possible in case of $CH_2 = CHCl$.

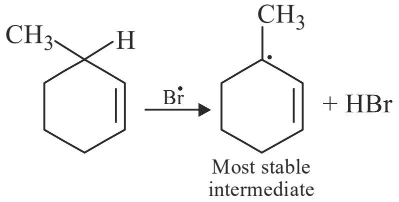
8. (c) :

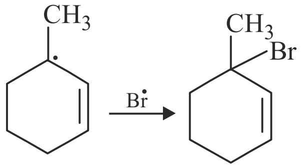


$$\underset{}{CH_3—\overset{\displaystyle Br}{\overset{|}{C}H} — CH_2—\overset{\displaystyle Br}{\overset{|}{C}H} — CH_2—CH_3} \xrightarrow[\Delta]{\text{E2 reaction} \mid KOH, CH_3OH} CH_3—CH=CH — CH=CH — CH_3$$

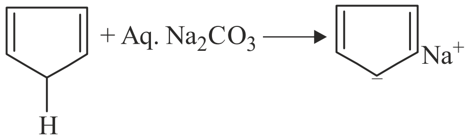
9. (a) : For geometrical isomerism, different groups should be attached to each sp^2 hybridised C-atom.

10. (d) : $Br_2 \xrightarrow{hv} 2\dot{B}r$



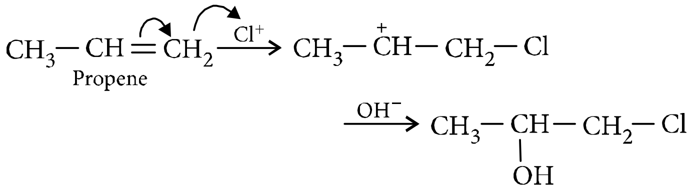


11. (a) :



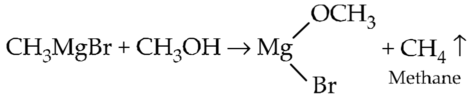
In the presence of aq. Na_2CO_3, compound in option (a) forms an aromatic compound that is why, it is the most reactive among the given options.

12. (b) : $HOCl \longrightarrow \overset{-}{O}H + Cl^+$

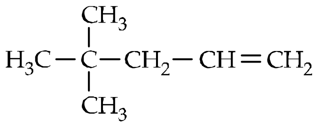


$$\underset{\text{Propene}}{CH_3-CH=CH_2} \xrightarrow{Cl^+} CH_3-\overset{+}{C}H-CH_2-Cl \xrightarrow{OH^-} CH_3-\underset{\displaystyle OH}{\underset{|}{C}H}-CH_2-Cl$$

13. (a) :

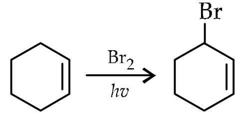


$$CH_3MgBr + CH_3OH \rightarrow Mg\begin{matrix} OCH_3 \\ Br \end{matrix} + \underset{\text{Methane}}{CH_4\uparrow}$$

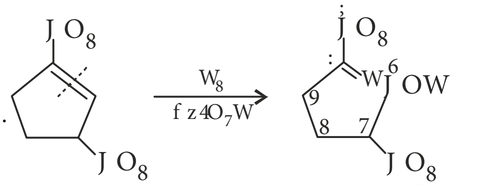
14. (b) : 

$$H_3C-\overset{CH_3}{\underset{CH_3}{C}}-CH_2-CH=CH_2$$

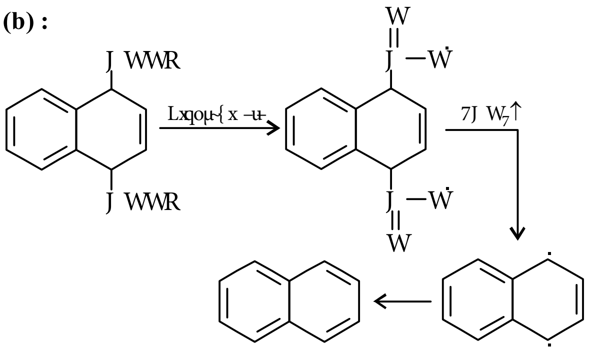
4, 4-Dimethylpentene

15. (d) : 

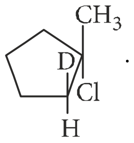
In presence of U.V. light allylic C – H bond undergoes bromination.

16. (d) : 

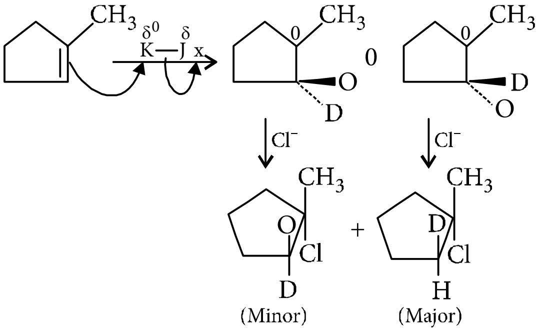
5- Keto-2-methylhexanal

17. (b) : 

-]µmxqpxqµ{ m{y mµuµ .

18. (b) : The addition of deuterium chloride to 1-methyl cyclopentene is entirely anti thus, 95% of the product formed is  .

(Major)



(Minor) (Major)

19. (a) : Moles of water produced = $\frac{0.72}{18} = 0.04$

Moles of CO_2 produced = $\frac{3.08}{44} = 0.07$

Equation for combustion of an unknown hydrocarbon, C_xH_y is

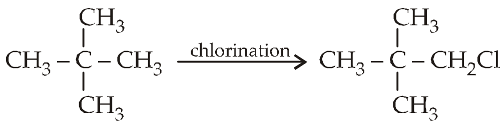
$$C_xH_y + \left(x+\frac{y}{4}\right)O_2 \rightarrow xCO_2 + \frac{y}{2}H_2O \Rightarrow x = 0.07 \text{ and } \frac{y}{2} = 0.04$$

$\therefore\ y = 0.08$

$$\frac{x}{y} = \frac{0.07}{0.08} = \frac{7}{8}$$

$\therefore$ The empirical formula of the hydrocarbon is C_7H_8.

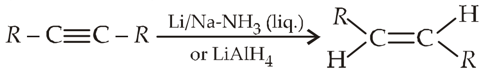
20. (a) : As the molecular mass indicates it should be pentane and neopentane can only form one mono substituted alkyl halide as all the hydrogens are equivalent in neopentane.



Neopentane

Only one mono-chloro derivative possible

21. (a, c) : For *trans* products we should take Na or Li metal in NH_3 or $EtNH_2$ at low temperature or $LiAlH_4$ as reducing agent (anti-addition).



anti-addition product (*trans*-alkene)

22. (d) : $\underset{\text{(Symm. alkene)}}{RCH{=}CHR} \xrightarrow[\text{(ii) Zn, } H_2O]{\text{(i) } O_3} 2RCHO$

Molecular mass of RCHO = 44 ⇒ $R + 12 + 1 + 16 = 44$

Mol. mass of $R = 44 - 29 = 15$

This is possible, only when R is —CH_3 group.

$\therefore$ The aldehyde is CH_3CHO and the symmetrical alkene is $CH_3HC{=}CHCH_3$.

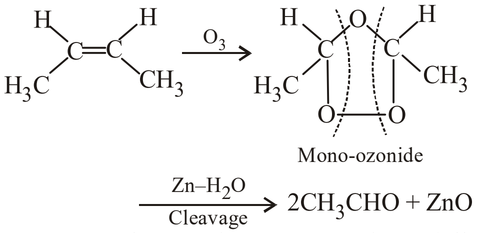
$$\underset{\text{2-Butene}}{CH_3CH{=}CHCH_3} \xrightarrow[\text{(ii) Zn, } H_2O]{\text{(i) } O_3} \underset{\text{Acetaldehyde}}{2CH_3CHO}$$

23. (a) : Grignard reagent reacts with compounds having active or acidic hydrogen atom to give alkane.

$CH_3MgX + CH_3C \equiv C\text{–}H \rightarrow CH_4 + CH_3C \equiv CMgX$

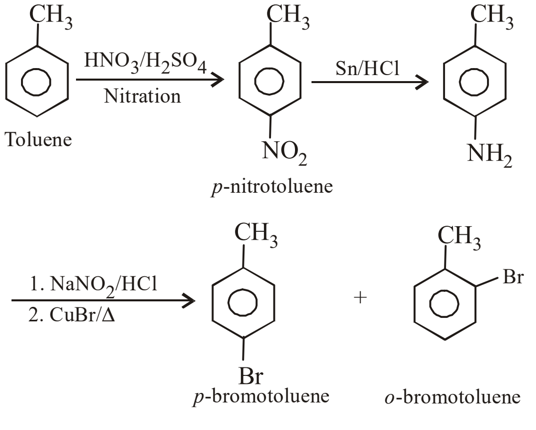
24. (c) : Terminal alkynes react with sodium in liquid ammonia to yield ionic compounds *i.e.* sodium alkylides.

25. (a) : The complete reaction sequence is as follows :

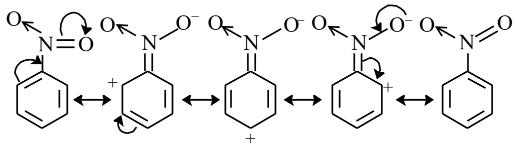


Mono-ozonide

26. (b) : The reaction sequence is as follows :

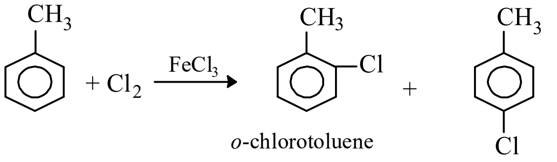


27. (a) :



From the resonating structures of it can be seen that the nitrogroup withdrawn electrons from the rings and hence it deactivates the benzene ring for further electophilic substitution.

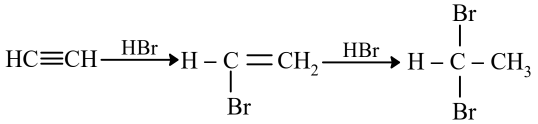
28. (d) :



o-chlorotoluene

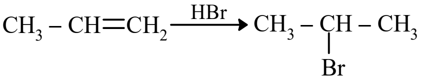
p-chlorotoluene

29. (b) :



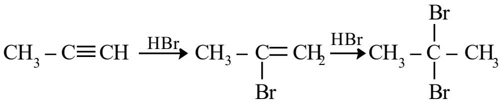
$HC\equiv CH \xrightarrow{HBr} H-\underset{Br}{\underset{|}{C}}=CH_2 \xrightarrow{HBr} H-\overset{Br}{\overset{|}{\underset{Br}{\underset{|}{C}}}}-CH_3$

1, 1-dibromoethene



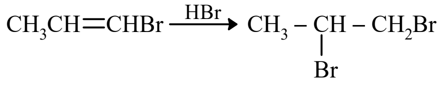
$CH_3-CH=CH_2 \xrightarrow{HBr} CH_3-\underset{Br}{\underset{|}{CH}}-CH_3$

2-bromopropane



$CH_3-C\equiv CH \xrightarrow{HBr} CH_3-\underset{Br}{\underset{|}{C}}=CH_2 \xrightarrow{HBr} CH_3-\overset{Br}{\overset{|}{\underset{Br}{\underset{|}{C}}}}-CH_3$

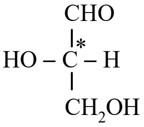
2, 2-dibromopropane



$CH_3CH=CHBr \xrightarrow{HBr} CH_3-\underset{Br}{\underset{|}{CH}}-CH_2Br$

1, 2-dibromopropane

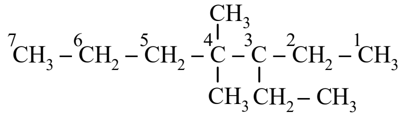
30. (b) :



$HO-\overset{CHO}{\overset{|*}{\underset{CH_2OH}{\underset{|}{C}}}}-H$

Due to the presence of chiral carbon atom, it is optically active, hence it is expected to rotate plane of polarized light.

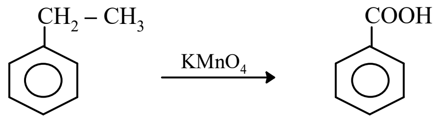
31. (a) :



$^7CH_3-{}^6CH_2-{}^5CH_2-{}^4\overset{CH_3}{\overset{|}{\underset{CH_3}{\underset{|}{C}}}}-{}^3\underset{CH_2-CH_3}{\underset{|}{C}}-{}^2CH_2-{}^1CH_3$

3-ethyl-4, 4-dimethylheptane

32. (d) :

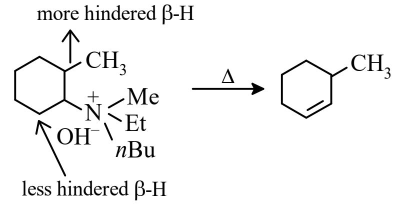


Ethyl benzene

Benzoic acid

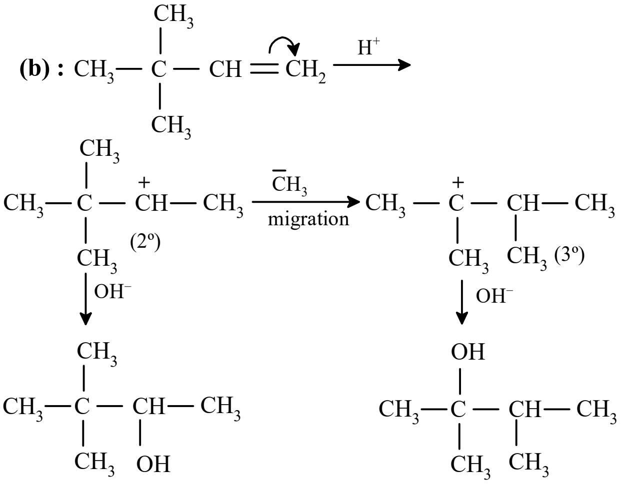
When oxidises with alkaline $KMnO_4$ or acidic $Na_2Cr_2O_7$, the entire side chain (in benzene homologues) with atleast one H at α-carbon, regardless of length is oxidised to –COOH.

33. (d) :



In Hofmann elimination reaction, it is the less sterically hindered β-hydrogen that is removed and hence less substituted alkene is the major product.

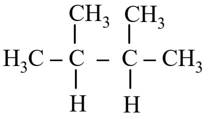
34. (b) :



(secondary alcohol)

(tertiary alcohol)

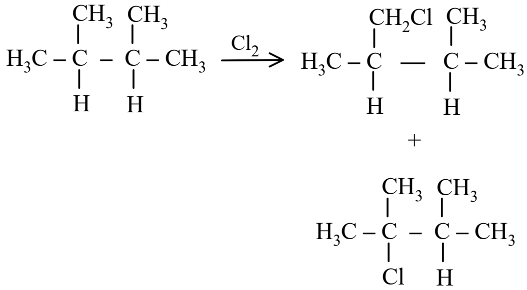
35. (b) : The number of monohalogenation products obtained from any alkane depends upon the number of different types of hydrogen it contains.



$H_3C-\overset{CH_3}{\overset{|}{\underset{H}{\underset{|}{C}}}}-\overset{CH_3}{\overset{|}{\underset{H}{\underset{|}{C}}}}-CH_3$

2,3-dimethylbutane

2,3-dimethylbutane has two types of hydrogen atoms so on monochlorination gives only two monochlorinated compounds.



36. (b) : 1,2-addition product is kinetically controlled product while 1,4-addition product is thermodynamically controlled product and formed at comparatively higher temperature.

$CH_2=CH-CH=CH_2 \xrightarrow[40°]{HBr} \underset{\text{1,4-addition}}{CH_2(Br)CH=CHCH_3} + \underset{\text{1,2-addition}}{CH_3CH(Br)-CH=CH_2}$

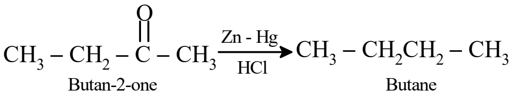
Therefore, 1-bromo-2-butene will be the main product under thermodynamically controlled conditions.

37. (b) : The reactivity order of abstraction of H atoms towards bromination of alkane is 3°H > 2°H > 1°H.

$$\text{So,}(CH_3)_2CHCH_2CH_3 \xrightarrow[127°C]{Br_2/h\upsilon} (CH_3)_2C(Br)CH_2CH_3$$

2-methylbutane 2-bromo-2-methylbutane

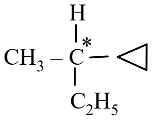
38. (d) : Butan-2-one will get reduced into butane when treated with zinc and hydrochloric acid following Clemmensen reaction whereas Zn/HCl do not reduce ester, acid and amide.



$$CH_3-CH_2-\overset{\overset{\Large O}{||}}{C}-CH_3 \xrightarrow[HCl]{Zn-Hg} CH_3-CH_2CH_2-CH_3$$

Butan-2-one Butane

39. (c) :



Optically active due to presence of chiral carbon atom.

40. (d) : Among the isomeric alkanes, the normal isomer has a higher boiling point than the branched chain isomer. The greater the branching of the chain, the lower is the boiling point.

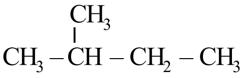
The *n*-alkanes have larger surface area in comparison to branched chain isomers (as the shape approaches that of a sphere in the branched chain isomers). Thus, intermolecular forces are weaker in branched chain isomers, therefore, they have lower boiling points in comparison to straight chain isomers.

41. (d) : The number of monohalogenation products obtained from any alkene depends upon the number of different types of hydrogen it contains.

Compound containing only one type of hydrogen gives only one monohalogenation product.

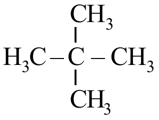
$CH_3CH_2CH_3$ — two types of hydrogen (two monohalogenation product)
Propane

$CH_3CH_2CH_2CH_2CH_3$— two types of hydrogen (two monohalogenation produc
Pentane



$$CH_3-\overset{\overset{\large CH_3}{|}}{CH}-CH_2-CH_3$$

— three types of hydrogen (three monohalogenation product)
Isopentane



$$H_3C-\underset{\underset{\large CH_3}{|}}{\overset{\overset{\large CH_3}{|}}{C}}-CH_3$$

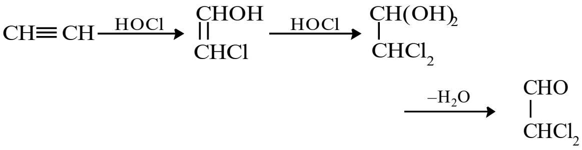
— one type of hydrogen (one monohalogenation product)
Neopentane

Thus the given alkane should be neopentane.

42. (d) : $H_3C-CH_2-CH{=}CH_2 \xrightarrow{Pd/H_2} H_3C-CH_2-CH_2-CH_3$

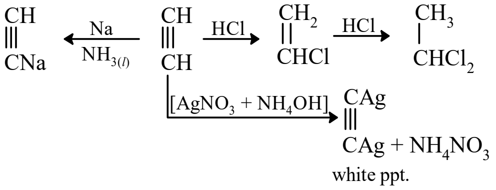
Butene - 1 Butane

43. (c) :



$$CH{\equiv}CH \xrightarrow{HOCl} \begin{matrix}CHOH\\ ||\\ CHCl\end{matrix} \xrightarrow{HOCl} \begin{matrix}CH(OH)_2\\ |\\ CHCl_2\end{matrix} \xrightarrow{-H_2O} \begin{matrix}CHO\\ |\\ CHCl_2\end{matrix}$$

44. (a) : Acetylene does not react with NaOH because product would be the stronger acid H_2O and the stronger base $\left(CH_3-C\equiv\bar{C}\right)$. Acetylene reacts with the other three as:



$$\begin{matrix}CH\\ |||\\ CNa\end{matrix} \xleftarrow[NH_{3(l)}]{Na} \begin{matrix}CH\\ |||\\ CH\end{matrix} \xrightarrow{HCl} \begin{matrix}CH_2\\ ||\\ CHCl\end{matrix} \xrightarrow{HCl} \begin{matrix}CH_3\\ |\\ CHCl_2\end{matrix}$$

$$\begin{matrix}CH\\ |||\\ CH\end{matrix} \xrightarrow{[AgNO_3 + NH_4OH]} \begin{matrix}CAg\\ |||\\ CAg\end{matrix} + NH_4NO_3$$

white ppt.