

N.B.Navale

Date : 01.04.2025

Time : 01:20:06

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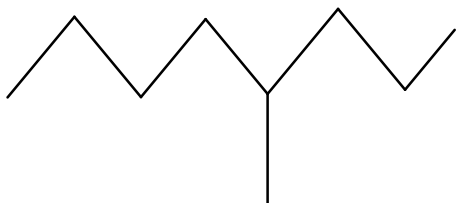
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CHEMISTRY

HYDROCARBONS

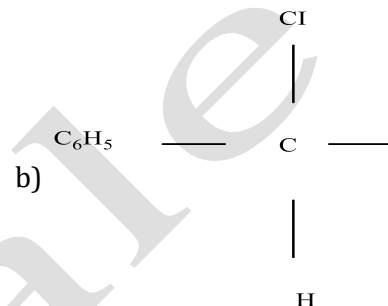
Single Correct Answer Type

1. The IUPAC name of compound



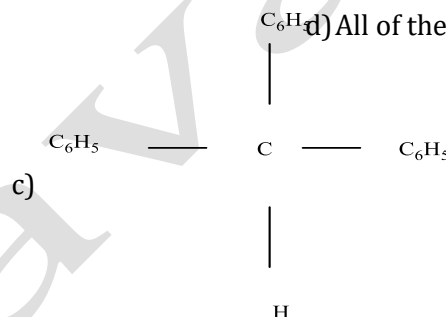
- a) 4-methyloctane b) 2-propylhexane
c) 2-butylpentane d) None of these
2. Which one of the following has the smallest heat of hydrogenation per mole?
a) 1-butene b) Trans-but-2-ene
c) C/s-but-2-ene d) Buta-1,3-diene
3. $\text{CaC}_2 + \text{H}_2\text{O} \xrightarrow{\text{H}_2\text{SO}_4/\text{HgSO}_4} \text{A} \rightarrow \text{B}$
Identify A and B in the given reaction.
a) C_2H_2 and CH_3CHO b) CH_4 and HCOOH
c) C_2H_4 and CH_3COOH d) C_2H_2 and CH_3COOH
4. The product(s) obtained via oxymercuration ($\text{HgSO}_4 + \text{H}_2\text{SO}_4$) of but-1-yne would be
a) $\text{CH}_3\text{CH}_2\text{COCH}_3$ b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$
c) $\text{CH}_3\text{CH}_2\text{CHO} + \text{HCHO}$ d) $\text{CH}_3\text{CH}_2\text{COOH} + \text{HCOOH}$
5. Among the following, the compound that can be most readily sulphonated is
a) benzene b) nitrobenzene
c) toluene d) chlorobenzene
6. Which of the following conformation has maximum energy?
a) Eclipsed b) Staggered
c) Gauche d) Equal
7. Conversion of hexane into benzene involves the reaction of
a) hydration b) hydrolysis
c) hydrogenation d) dehydrogenation
8. An activating group
a) activates only ortho and para positions b) deactivates meta position
c) activates ortho and para more than meta d) deactivates meta more than ortho and para
9. A Friedel-Crafts reaction of benzene with chloroform produces

- a) $\text{C}_6\text{H}_5\text{CHCl}_2$



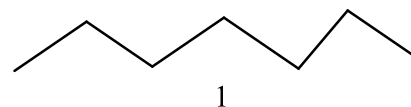
b)

c) All of these

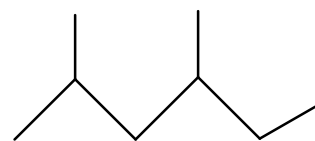


c)

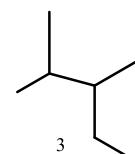
10. Rank the following substances in decreasing order of heat of combustion (most exothermic → least exothermic).



1



2



3

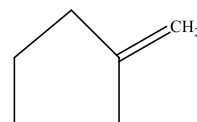
a) $2 > 1 > 3$

b) $2 > 3 > 1$

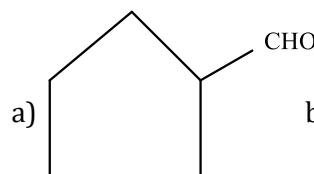
c) $3 > 1 > 2$

d) $3 > 2 > 1$

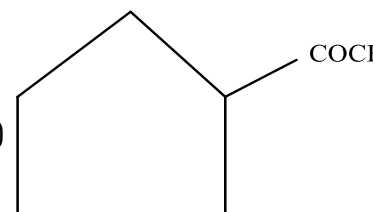
- 11.



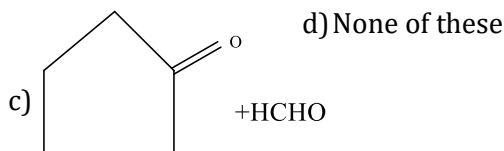
on ozonolysis gives



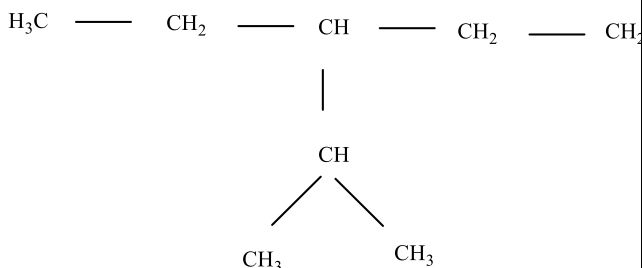
a)



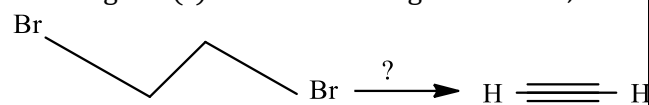
b)



12. The correct IUPAC name of the following alkane is



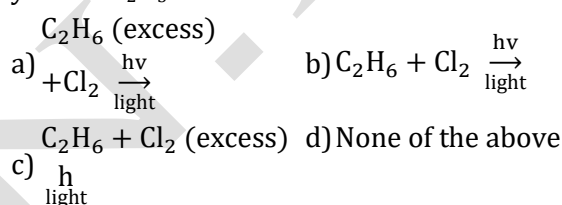
- a) 3,6-diethyl-2-methyloctane
b) 5-isopropyl-3-ethyloctane
c) 3-ethyl-5-isopropyloctane
d) 3,3-isopropyl-6-ethyloctane
13. The reagents(s) for the following conversion,



is/are

- a) alcoholic KOH
b) alcoholic KOH followed by NaNH_2
c) aqueous KOH followed by NaNH_2
d) $\text{Zn}/\text{CH}_3\text{OH}$
14. The reaction of toluene with chlorine in the presence of ferric chloride gives predominantly
- a) benzoyl chloride
b) m-chlorotoluene
c) benzyl chloride
d) o-chlorotoluene and p-chlorotoluene

15. The reaction conditions leading to the best yield of $\text{C}_2\text{H}_5\text{Cl}$ are



16. Which of the following alkane on mono chlorination produces racemic mixture?

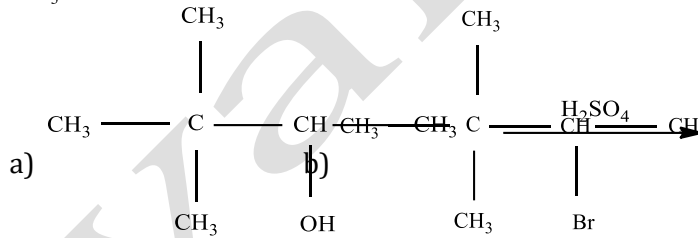
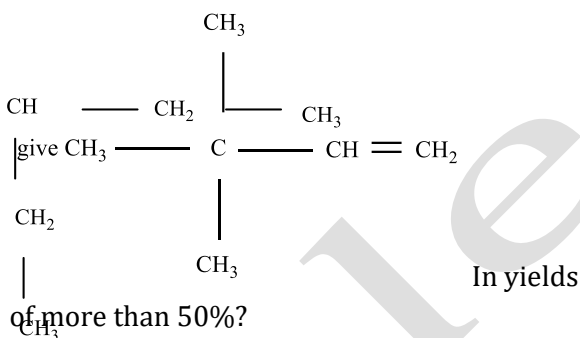
- a) neo-pentane
b) n-butane
c) 2, 3-dimethylbutane
d) 2,2,3,3-tetramethylbutane

17. An alkyl bromide, RBr of molecular weight 151 is the exclusive product of bromination of which hydrocarbon?

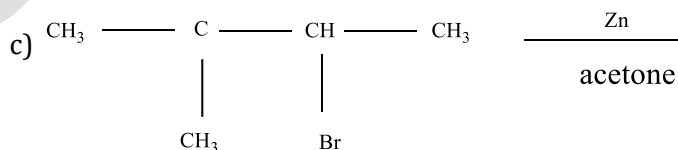
- a) Dodecane
b) 2-

- c) 2, 2-dimethylhexane
d) 2, 2, 3-trimethylheptane

18. Which of the following reactions is not expected to



- c) 
- d) None of the above



19. How many isomers are possible for an alkane having molecular formula C_5H_{12} ?

- a) 5
b) 3
c) 4
d) 2

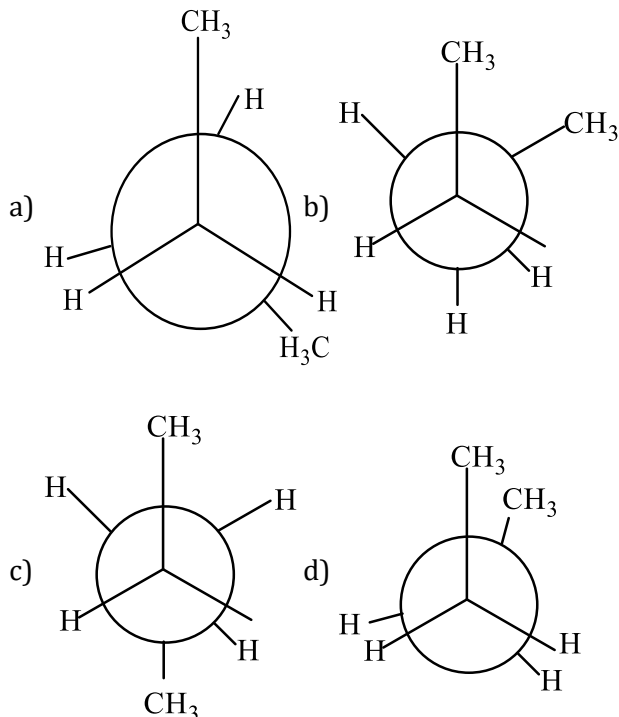
20. Select the correct statement (s).

- a) Staggered and eclipsed conformers cannot be physically separated because the energy difference between them is so small that they readily interconvert at room temperature
- b) Conformers are their existence to the tetrahedral nature of carbon bonding and the fact that the σ -bond is cylindrically symmetrical
- c) Both (a) and (b) are correct
- d) None of the above

21. $\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{400-600^\circ\text{C}} \text{X} + \text{Y}$
X and Y are

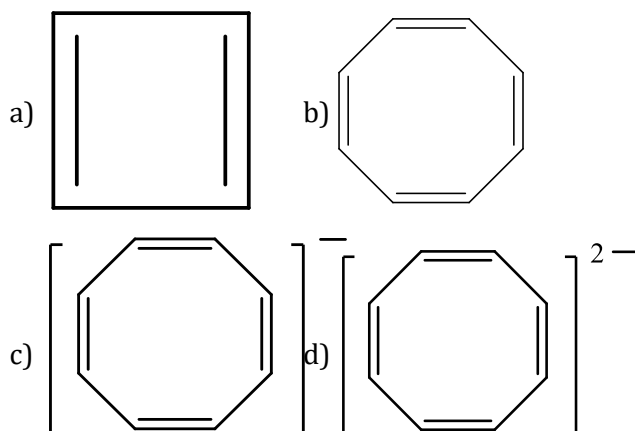
- a) hydrogen, methane
b) methane, ethylene
c) hydrogen, ethylene
d) ethylene, ethane

22. In the following, the most stable conformation of n-butane is

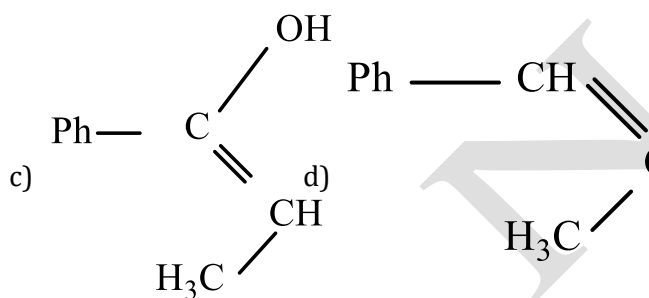
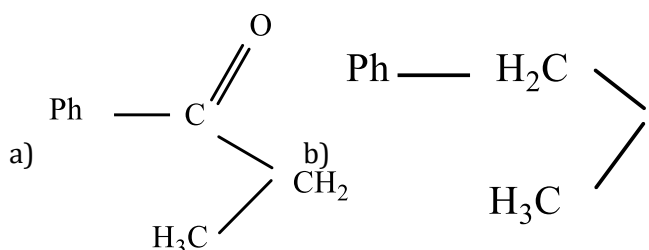
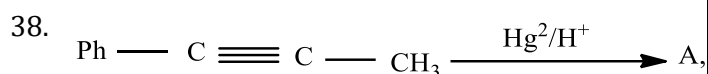
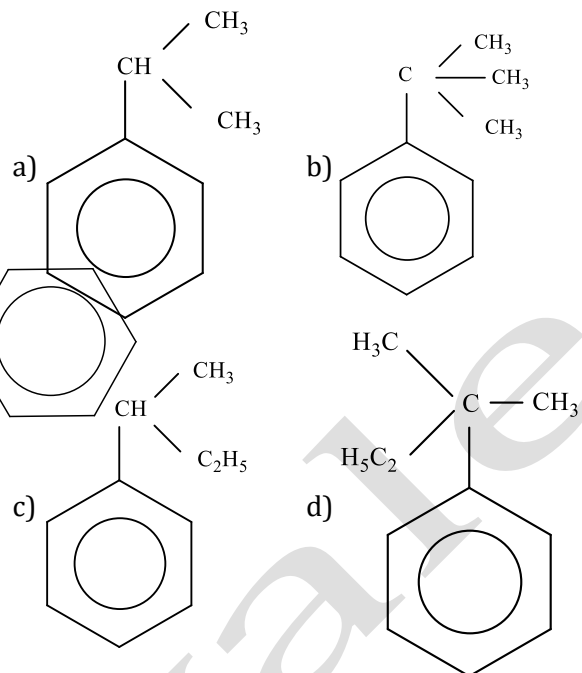
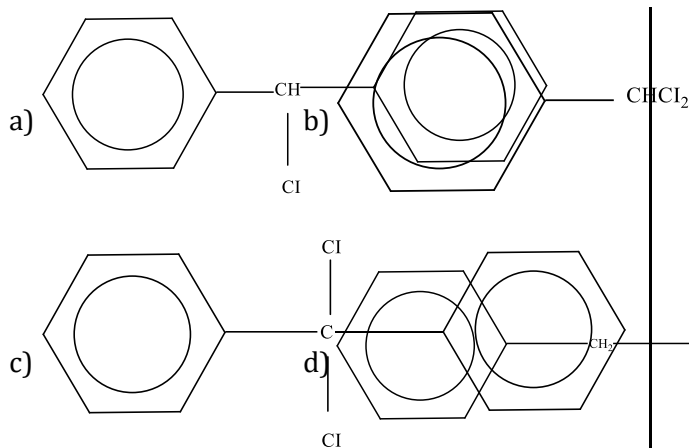


23. Eclipsed form of ethane has higher energy due to
 a) torsional strain b) steric strain
 c) angle strain d) Both (a) and (b)
24. An unsaturated hydrocarbon 'A' adds two molecules of H_2 and on reductive ozonolysis gives butane - 1, 4- dial, ethanol and propanone. Give the IUPAC name of A.
 a) 3-methylocta-2,6-diene b) 2-methylocta-2,5-diene
 c) 2-methylocta-2,6-diene d) 2-methylocta-3,5-diene
25. On mixing a certain alkane with chlorine and irradiating it with UV light, it forms one monochloro alkane. The alkane could be
 a) neo-pentane b) propane
 c) pentane d) iso-pentane
26. Which of the following annulenes is anti-aromatic?
 a) Benzene b) Cyclobutadiene
 c) Cyclodecapentene d) Cyclooctatetraene
27. Hydrocarbon which is liquid at room temperature is
 a) pentane b) butane
 c) propane d) ethane
28. Nitrobenzene can be prepared from benzene by using a mixture of concentrated HNO_3 and concentrated H_2SO_4 . In the nitrating mixture, HNO_3 acts as
 a) base b) acid

- c) reducing agent d) catalyst
29. Arrange the following hydrogen halides in the order of their decreasing reactivity with propene.
 a) $HCl > HBr > HI$ b) $HBr > HI > HCl$
 c) $HI > HBr > HCl$ d) $HCl > HI > HBr$
30. The final product in the following sequence of reaction is
 $CH \equiv CH \xrightarrow{NaNH_2} A \xrightarrow{CH_3Br} B$
 a) $CH_2 = CH - CH = CH_2$ b) $HC \equiv C - CH_3$
 c) $CH_2 = CH - CH_3$ d) $CH_3 - CH_2 - CH_3$
31. The addition of HCl to 3,3,3-trichloropropene gives
 a) $Cl_3CCH_2CH_2Cl$ b) $Cl_3CCH_2CHCl_2$
 c) $Cl_2CHCH_2CHCl_2$ d) $Cl_2CHCH(Cl)CH_2Cl$
32. The compound with the highest boiling point is
 a) n-hexane b) n-pentane
 c) 2, 2-dimethylpropane d) 2-methylbutane
33. The alkene which on hydrogenation give 2-methyl butane is
 a) 2-methylbut-1-ene b) 2-methylbut-2-ene
 c) 3-methylbut-1-ene d) All of these
34. The treatment of benzene with benzoyl chloride in the presence of $AlCl_3$ gives
 a) benzaldehyde b) benzophenone
 c) diphenyl d) cyclohexane
35. The best method to prepare cyclohexene from cyclohexanol is by using
 a) conc. $HCl + ZnCl_2$ b) conc. H_3PO_4
 c) HBr d) conc. HCl
36. Which among the following is aromatic?



37. When excess of C_6H_6 reacts with CH_2Cl_2 in the presence of anhydrous $AlCl_3$, the following compound is obtained



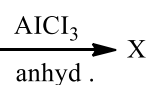
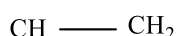
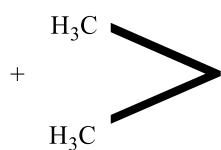
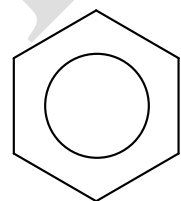
39. Alkyne, C_7H_{12} , when reacted with alkaline KMnO_4 followed by acidification with HCl gives a mixture of $(\text{CH}_3)_2\text{CHCOOH} + \text{CH}_3\text{CH}_2\text{COOH}$. The alkyne C_7H_{12} is

- a) 3-hexyne b) 2-methyl-2-hexene
c) 2-methyl-3-hexyne d) 3-methyl-2-hexyne

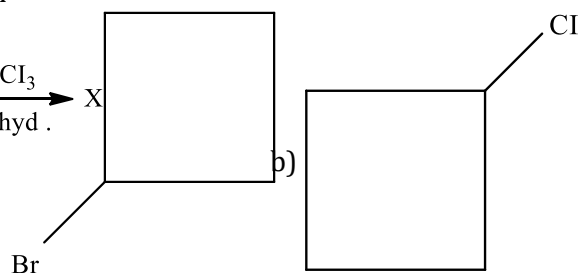
40. Water can be added across a triple bond in the presence of

- a) acidic medium b) alkaline medium
c) neutral medium d) acid and HgSO_4

41.



a)

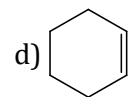
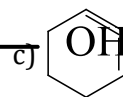
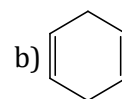
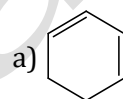


Identify the X in the above reaction.

42. Acetylene and HCHO reacts in the presence of copper acetylide catalyst to form

- a) 1-butyne-1, 4-diol b) 2-butyne-1, 2-diol
c) 2-butyne-1, 4-diol d) None of these

43. Which of the following compounds is the most stable?



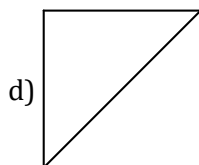
44. In the iodination of alkane, some HIO_3 is also added so that

- a) reaction is made faster b) reaction is made reversible
c) HI formed is oxidized to I_2 d) reaction is selective

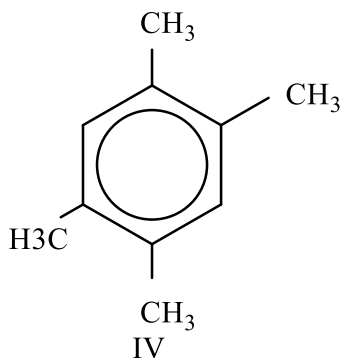
45. The reaction of propene with HOCl proceeds via the addition of

- a) Cl^+ and OH^- in a single step b) Cl^+ in the first step
c) H^+ in the first step d) OH^- in the first step

46. What would be the product formed when 1-bromo-3-chloro cyclobutane reacts with two equivalents of metallic sodium in ether?



- a) $\begin{array}{c} \text{CH}_3\text{CH}_2 \\ | \\ \text{CH} \\ | \\ \text{Br} \end{array}$
- b) $\begin{array}{cccc} \text{CH}_3 & \text{CH} & \text{CH} & \text{CH}_3 \\ | & | & | & \\ & \text{Br} & \text{CH}_3 & \end{array}$
- c) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{CH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$
- d) $\begin{array}{c} \text{CH}_3\text{CH}_2 \quad \text{CHCH}_2\text{Br} \\ | \\ \text{CH}_3 \end{array}$

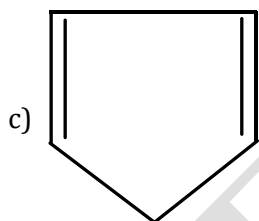
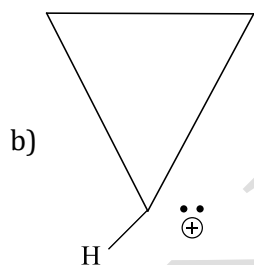
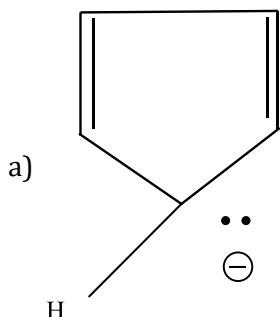


- a) I > II > III > IV b) IV > III > II > I
c) I > III > IV > II d) II > III > I > IV

58. Arrange benzene, n-hexane and ethyne and in the decreasing order of acidic behaviour.

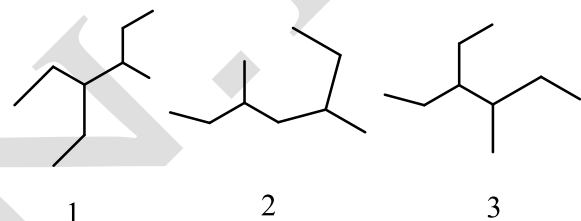
- a) Ethyne > benzene > hexane
b) Hexane > benzene > ethyne
c) Ethyne > hexane > benzene
d) Benzene > hexane > ethyne

59. Which of the following species will be aromatic?



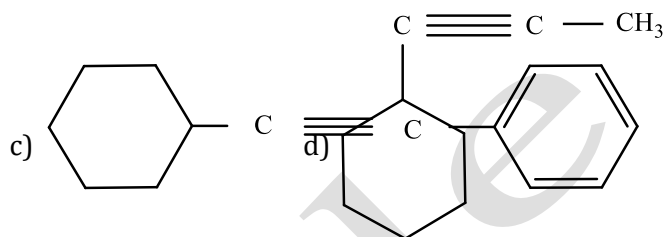
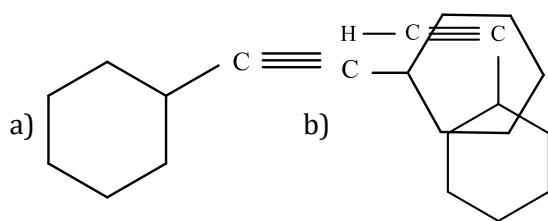
d) None of these

60. Choose the response that best describes the following compounds

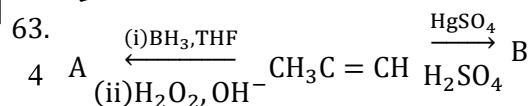
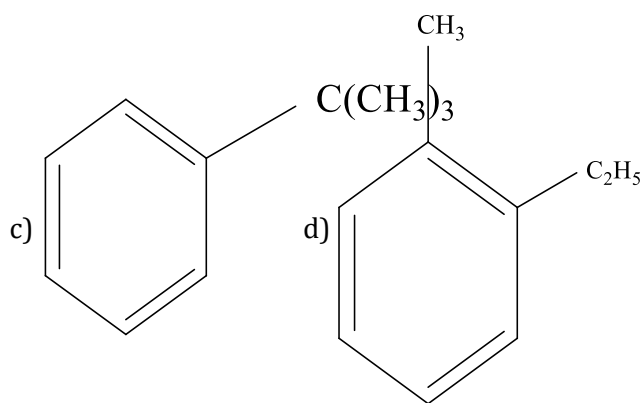
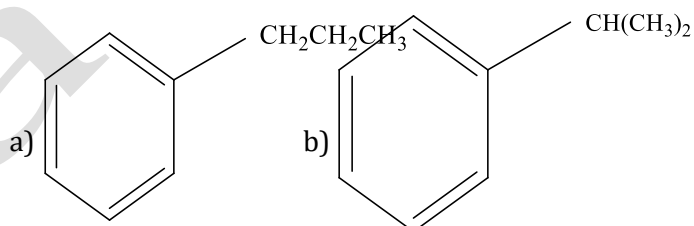
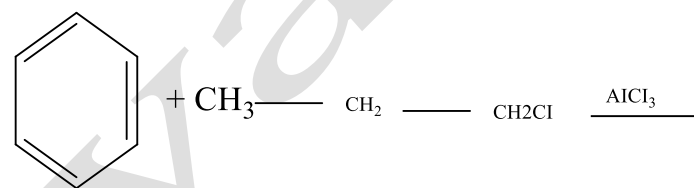


- a) 1, 3 and 4 represent the same compound
b) 1 and 3 are isomers of 2 and 4
c) 1 and 4 are isomers of 2 and 3
d) All the structures represent the same compound

61. Which of the following form alkynide?

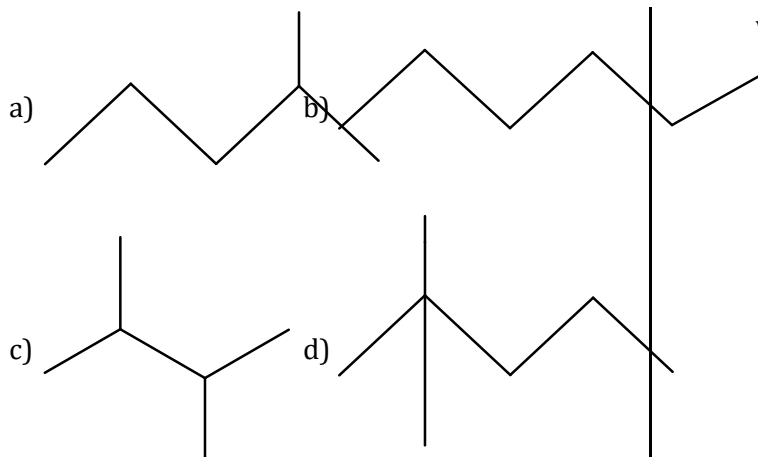


62. What will be the product obtained as a result of the following reaction and why?

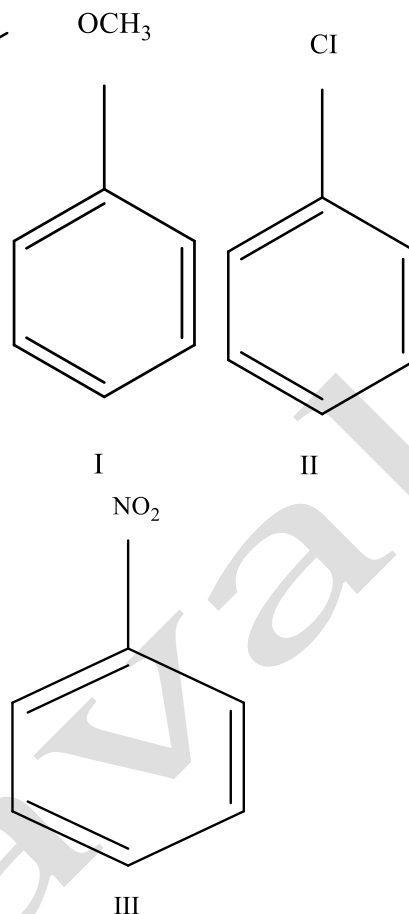


Identify A and B.

- a) CH₃CHO, CH₃COCH₃ b) CH₃CH₂CHO, CH₃COC
c) CH₃CH₂CHO, CH₃COCH₃ d) HCHO, CH₃COCH₃
64. Which of the following has maximum boiling point?



with an electrophile.



65. Which of the following is a 3-methylbutyl group?

- a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2$ b) $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2 -$
 c) $(\text{CH}_3\text{CH}_2)_2\text{CH} -$ d) $(\text{CH}_3)_3\text{CCH}_2 -$

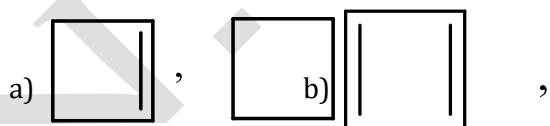
66. C_8H_{18} with two quaternary carbon atoms will have

- a) one- CH_2 and six- CH_3 groups b) one- CH_2 and five- CH_3 groups
 c) two- CH_2 and four- CH_3 groups d) six CH_3 groups

67. Among the following statements on the nitration of aromatic compounds, the false one is

- a) the rate of nitration of benzene is almost the same as that of hexadeuterobenzene
 b) the rate of nitration of toluene is greater than that of benzene
 c) the rate of nitration of benzene is greater than that of hexadeuterobenzene
 d) nitration is an electrophilic substitution reaction

68. $\text{A}(\text{C}_4\text{H}_6) \xrightarrow{\text{H}_2, \text{Ni}} \text{B}(\text{C}_4\text{H}_8) \xrightarrow{\text{O}_3/\text{H}_2\text{O}/\text{Zn}} \text{CH}_3\text{CHO}$.
 Thus, A and B are



- c) $\text{CH}_3\text{CH}_2\text{C} \equiv \text{CH}, \text{CH}_3\text{CH} = \text{CHCH}_3$
 d) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2, \text{CH}_3\text{CH} = \text{CH} - \text{CH}_3$

69. Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is

- a) 2-methylpentane b) 2, 2-dimethylbutane
 c) 2, 3-dimethylbutane d) n-hexane

70. Arrange the following set of compounds in the order of their decreasing relative reactivity

- a) I > II > III b) I > III > II
 c) II > I > III d) II > III > I

71. The reduction of 4-octyne with H_2 in the presence of Pd/CaCO_3 quinoline gives

- a) trans-4-octene b) cis-4-octene
 c) a mixture of cis-and trans-4-octene d) a completely reduced product C_8H_{18}

72. Propyne and propene can be distinguished by

- a) conc. H_2SO_4 b) Br_2 in CCl_4
 c) alk. KMnO_4 d) AgNO_3 in NH_3

73. On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane would be

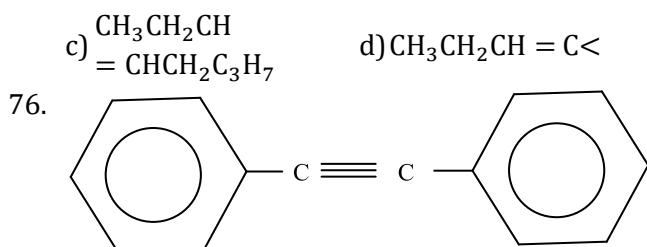
- a) propane b) pentane
 c) iso-pentane d) neo-pentane

74. What is the range of number of carbon atoms in alkanes found in paraffin wax?

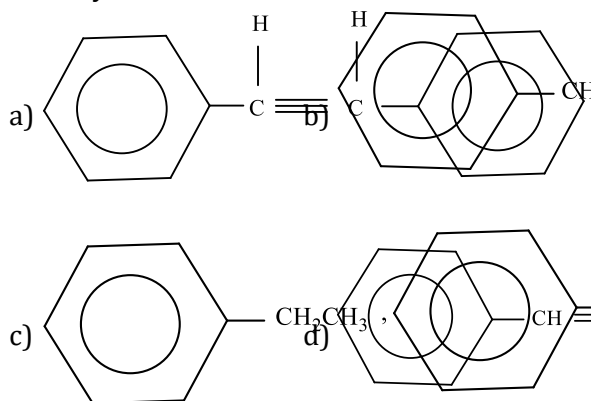
- a) C_{21} to C_{30} b) C_{19} to C_{20}
 c) C_6 to C_8 d) C_{17} to C_{18}

75. Propanal and pentan-3-one are ozonolysis product of an alkene. What is the structural formula of the alkene?

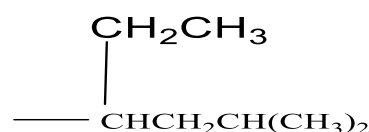
- a) $\text{CH}_3\text{CH}_2\text{CH} = \text{C}(\text{C}_2\text{H}_5)_2$ b) $\text{CH}_3\text{CH} = \text{CHCH}(\text{C}_2\text{H}_5)_2$



Identify A and B.



77. What is the correct IUPAC name of the alkyl group shown?



- a) 1-ethyl-3-methylbutyl b) 1-ethyl-3,3-dimethylpropyl
- c) 4-ethyl-2-methylbutyl d) 5-methylhexyl

78. Consider the following statements :

- I . In a group of isomeric acyclic compounds, normal compound always has the highest boiling and melting point.
- II . Greater the branching in alkanes, lower is the boiling point.
- III . Melting point of alkanes depend upon the packing of molecules in the crystalline lattice.
- Select the correct statement (s).

- a) Both I and II b) Both II and III
- c) Both I and III d) All of these

79. Arrange the following set of compounds in the order of their decreasing relative reactivity with an electrophile, E^+

- I . chlorobenzene
- II . 2,4-dinitrochlorobenzene
- III . p-nitrochlorobenzene
- IV . toluene
- V . p- $\text{H}_3\text{C} - \text{C}_6\text{H}_4 - \text{NO}_2$,

- a) I > II > III > IV > V b) IV > V > I > III > II
- c) V > IV > III > II > I d) I > III > II > V > IV

80. Arenes on treatment with chlorine in presence of ferric chloride as a catalyst undergoes what type of reaction?

- a) Electrophilic substitution b) Nucleophilic substitution
- c) Electrophilic addition d) Nucleophilic addition

81. Which of the following alkanes can be easily sulphonated?

- a) n-butane b) iso-butane
- c) n-pentane d) n-hexane

82. Benzyl chloride ($\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$) can be prepared from toluene by chlorination with

- a) SO_2Cl_2 b) SOCl_2
- c) Cl_2 d) NaOCl

83. The order of stability for the conformations of n-butane among these is

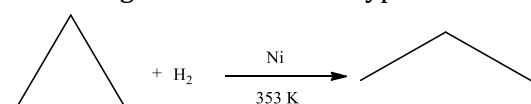
- I . anti II . gauche
- III . eclipsed (partial) IV . eclipsed (full)

- a) I > II > III > IV b) IV > III > II > I
- c) III > II > I > IV d) II > III > I > IV

84. Arrange the halogens F_2 , Cl_2 , Br_2 , I_2 . in order of their increasing reactivity with alkanes .

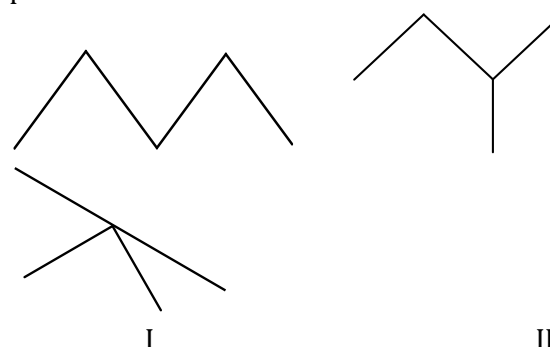
- a) $\text{I}_2 < \text{Br}_2 < \text{Cl}_2 < \text{F}_2$ b) $\text{Br}_2 < \text{Cl}_2 < \text{F}_2 < \text{I}_2$
- c) $\text{F}_2 < \text{Cl}_2 < \text{Br}_2 < \text{I}_2$ d) $\text{Br}_2 < \text{I}_2 < \text{Cl}_2 < \text{F}_2$

85. Following reaction is of the type



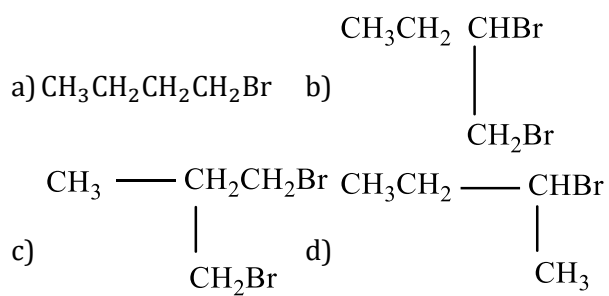
- a) nucleophilic addition b) nucleophilic substitution
- c) electrophilic addition d) electrophilic substitution

86. Which has maximum boiling point and melting point out of



- III
- a) I in both case b) Both I and II
- c) Both I and III d) Both II and I

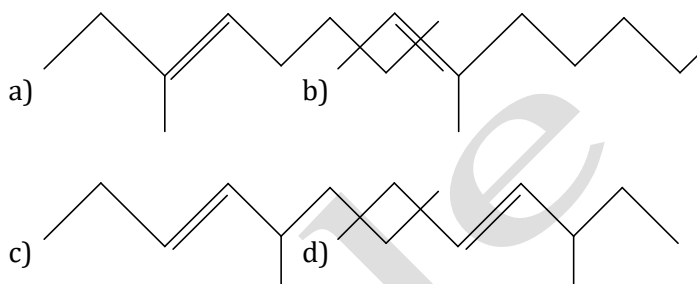
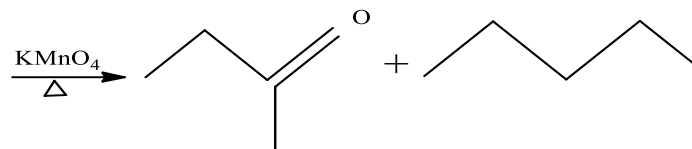
87. The major product of the reaction between n-butane and bromine at 130°C



88. The highest boiling point is expected for

- a) iso-octane b) n-octane
c) 2, 2, 3, 3-tetramethylbutane d) n-butane

89. Alkene(A)



N.B.Navale

Date : 01.04.2025

Time : 01:20:06

Marks : 89

TEST ID: 75

CHEMISTRY

HYDROCARBONS

: ANSWER KEY :

1)	a	2)	d	3)	a	4)	a	49)	c	50)	c	51)	a	52)	b
5)	c	6)	a	7)	d	8)	c	53)	d	54)	b	55)	a	56)	b
9)	c	10)	a	11)	c	12)	a	57)	a	58)	a	59)	a	60)	a
13)	b	14)	d	15)	a	16)	b	61)	b	62)	b	63)	b	64)	b
17)	b	18)	a	19)	b	20)	a	65)	b	66)	d	67)	a	68)	d
21)	b	22)	c	23)	d	24)	c	69)	c	70)	a	71)	b	72)	d
25)	a	26)	b	27)	a	28)	a	73)	d	74)	a	75)	a	76)	b
29)	c	30)	b	31)	a	32)	a	77)	a	78)	d	79)	b	80)	a
33)	d	34)	b	35)	b	36)	d	81)	d	82)	c	83)	a	84)	a
37)	d	38)	a	39)	c	40)	d	85)	c	86)	c	87)	d	88)	b
41)	b	42)	c	43)	a	44)	c	89)	a						
45)	b	46)	d	47)	a	48)	b								

Date : 01.04.2025

Time : 01:20:06

Marks : 89

TEST ID: 75

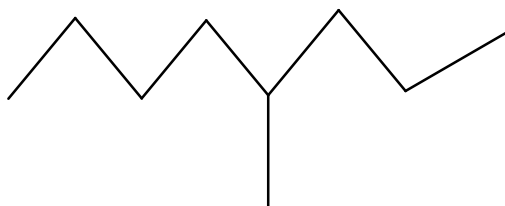
CHEMISTRY

HYDROCARBONS

: HINTS AND SOLUTIONS :

Single Correct Answer Type

1 (a)



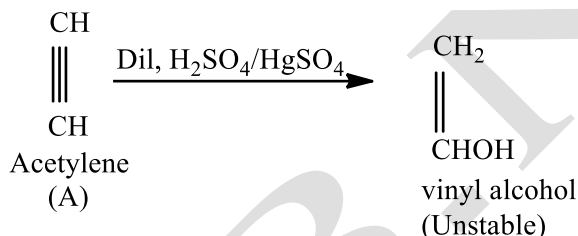
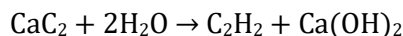
IUPAC name : 4 - methyloctane

2 (d)

Heat of hydrogenation $\propto \frac{1}{\text{stability}}$

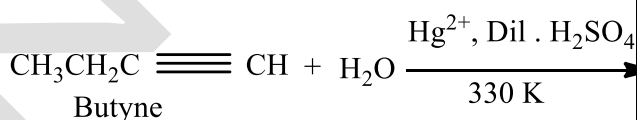
Among the given, buta-1,3-diene is resonance stabilized,
i.e. more stable, thus it has the lowest heat of hydrogenation.

3 (a)



4 (a)

In the presence of dil. H_2SO_4 and mercury salts, alkynes add a molecule of H_2O to form aldehydes or ketones.



5 (c)

Reactivity towards electrophilic substitution increases as the electron density in the benzene

ring increases.

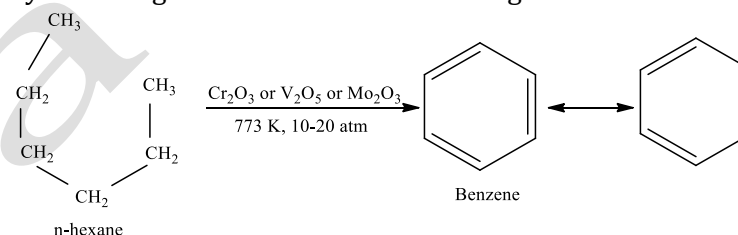
Since, CH_3 is a strong electron donating group thus toluene ($\text{C}_6\text{H}_5\text{CH}_3$) can be most readily sulphonated.

6 (a)

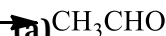
Eclipsed conformation has maximum energy.

7 (d)

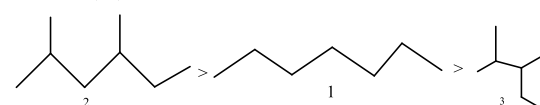
Hexane when heated to 773 K at 10-20 atm pressure in the presence of Cr_2O_3 , V_2O_5 or Mo_2O_3 supported over alumina gel undergoes dehydrogenation. (i.e. loss of hydrogen) and cyclized to give benzene and its homologous.



10 (a)

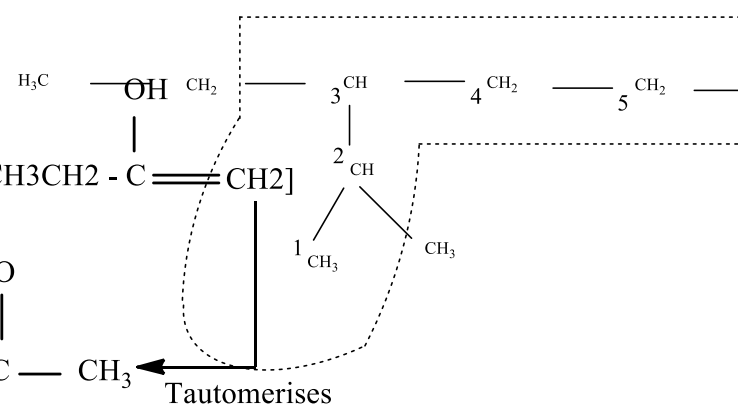


The correct decreasing order of heats of combustion is $2 > 1 > 3$.



12 (a)

The correct IUPAC name is



Longest chain - 8C - atom alkane = octane
Branch on 2, 3, 6 follows lowest sum rule.
Branch of 2C - methyl; 3, 6 C-atom- ethyl.
Ethyl comes alphabetically before methyl.

15 (a)

16 (b)

19 (b)

$$\begin{array}{c} \text{CH}_3 \text{ CH}_2 \text{ CH}_2 \text{ CH}_2 \text{ CH}_3, \text{ CH}_3 \text{ — } \overset{\text{CH}_3}{\underset{|}{\text{CH}}} \text{ — CH}_2 \text{ — CH}_3, \\ \text{n-pentane} \qquad \qquad \qquad \text{Isopentane} \end{array}$$

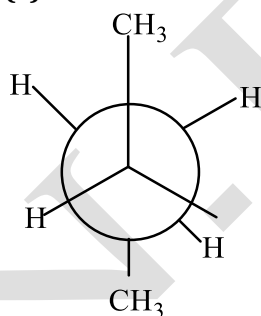
20 (a)

21 (b)

$$\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{400-600^\circ\text{C}} \text{CH}_2 = \text{CH}_2$$

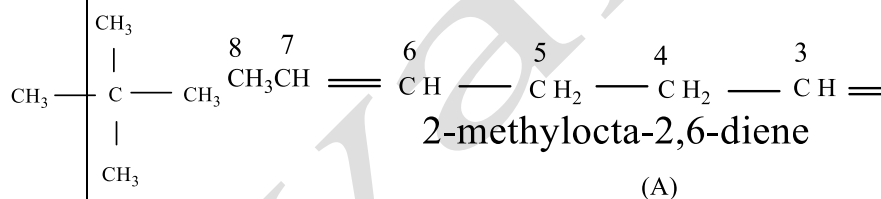
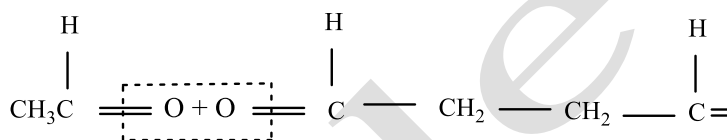
Propane Ethylene (X)

22 (c)



23 (d)

24 (c)



25 (a)

26 (b)

27 (a)

28 (a) Methan

$$\begin{array}{ccc} \text{HNO}_3 & + & \text{H}_2\text{SO}_4 \\ \text{Base} & & \text{Acid} \\ \text{(as proton acceptor)} & & \end{array} \quad \text{_____}$$

29 (c)

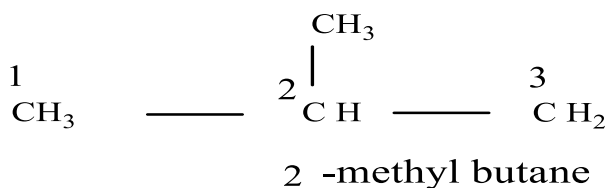
31 (a)



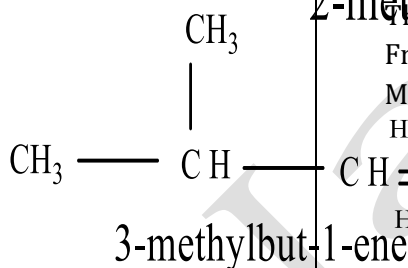
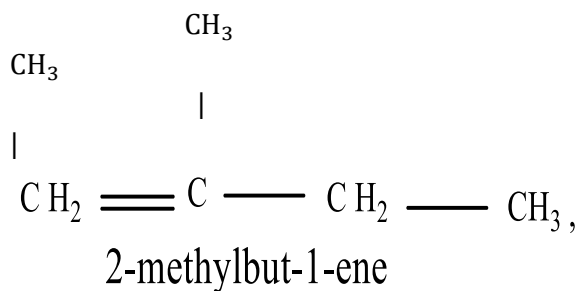
Page | 12

- 32 (a) n-hexane has highest boiling point due to more number of C-atom in linear chain.

- 33 (d) Structure of 2-methylbutane is



The structure of given alkenes are as :

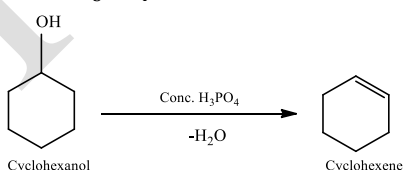


Thus, all give 2-methyl butane on hydrogenation.

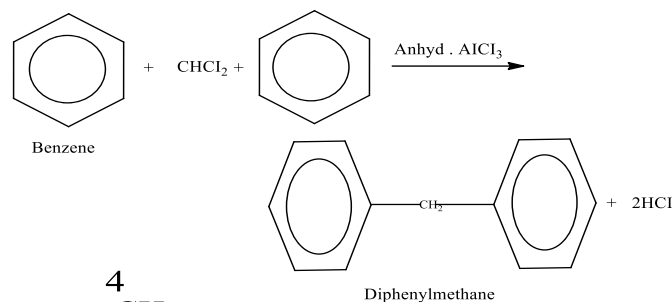
- 34 (b) Benzophenone (diphenyl ketone) can be prepared by the Friedel-Crafts condensation between benzoyl chloride and benzene.



- 35 (b) The best method to prepare cyclohexene from cyclohexanol is by using conc. H_3PO_4 because among given options dehydrating agent is only conc. H_3PO_4 .

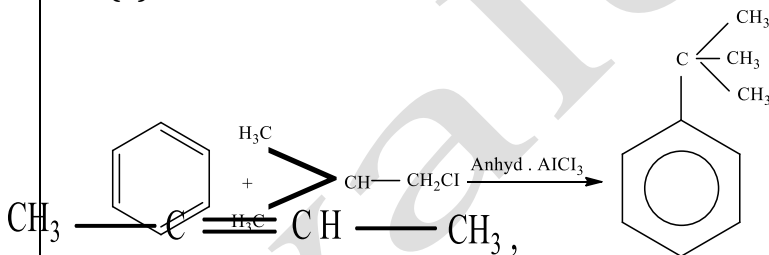


- 37 (d) When excess of benzene reacts with CH_2Cl_2 in the presence of anhyd. AlCl_3 , diphenylmethane is obtained.



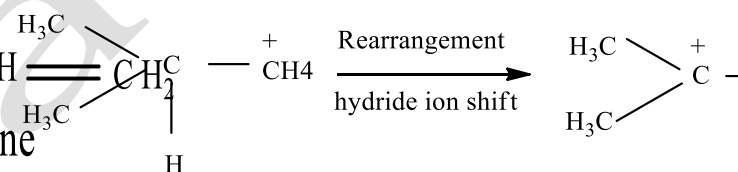
This reaction is an example of Friedel-Crafts reaction.

- 41 (b)



This reaction is an example of Friedel-Crafts reaction.

Mechanism



- 43 (a)

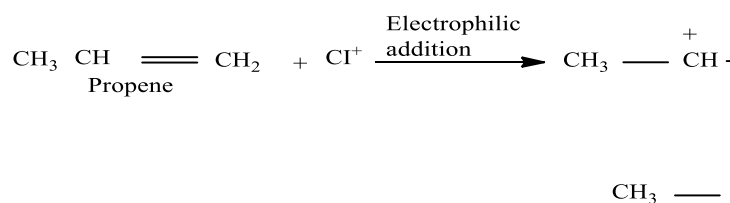
Conjugate dienes are more stable than other dienes.

- 44 (c)

In the iodination of alkane, some HIO_3 is also added so that HI formed is oxidized to I_2 .

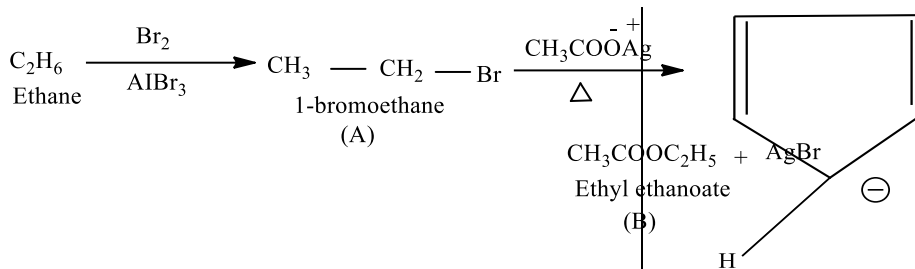
- 45 (b)

HOCl has Cl^+ and OH^- ions.



- 46 (d)

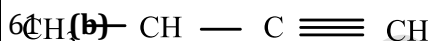
This reaction is Wurtz's type reaction.



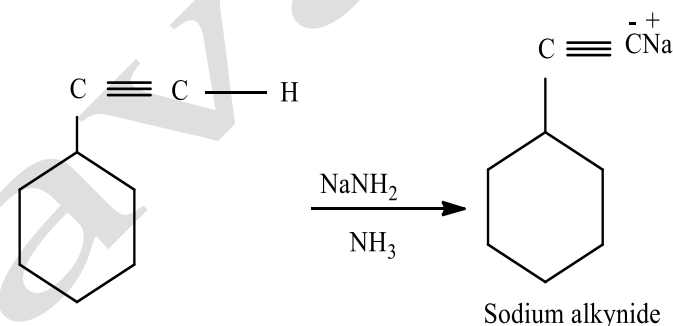
Cyclopentadienyl anion
 π -electrons = 4 + 2 = 6

As it obeys Huckel rule, it is aromatic.

Structure 1, 3 and 4 represent the same compound.



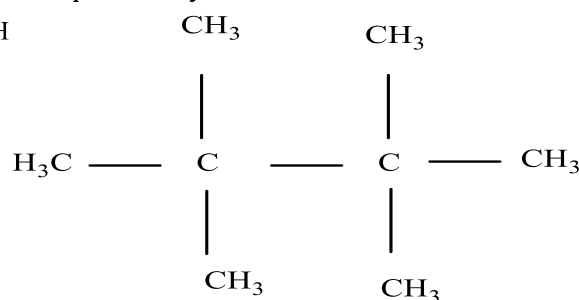
Only terminal alkynes when heated with sodamide (NaNH_2 in liq. NH_3) result in the formation of alkynide.



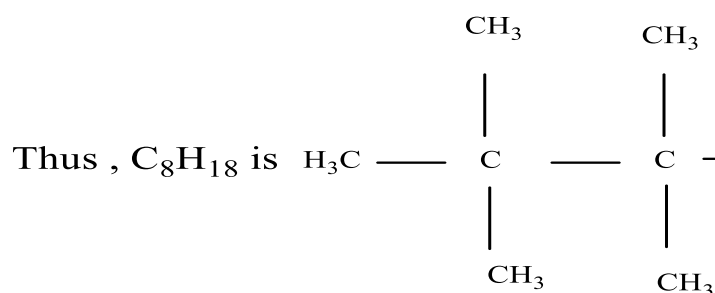
64 (b) Branching decreases boiling point. Hence, hexane (C_6H_{14}) has the maximum boiling point.

65 (b) $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2$ - is a 3-methylbutyl group.

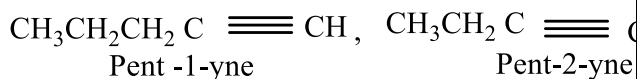
66 (d) Two quaternary carbons can be at terminal



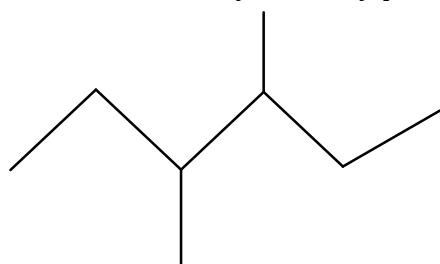
By structure two $(\text{CH}_3)_3\text{C}$ - are joined by C - C bond.



55 (a) C_5H_8 has three possible alkynes. These are :



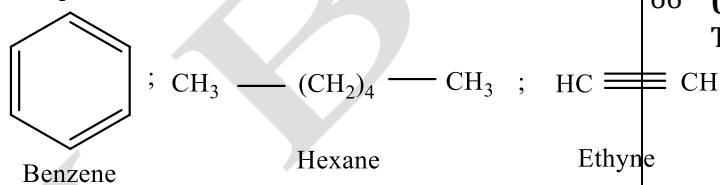
56 (b) An isomer of 3-ethyl-2-methylpentane is



3, 4-dimethylhexane.

57 (a) As the number of $-\text{CH}_3$ group increases, boiling point decreases.

58 (a) The hybridization state of carbon in the given compound is



Type of hybridization	sp^2
sp^3	sp
S-character	33.33%
25%	50%

Acidic character increases with increase in s-character of the orbital. Hence, decreasing order of acidic behaviour of benzene, n-hexane and ethyne is as follows :

Ethyne > Benzene > Hexane

59 (a)

It has six methyl groups.

69 (c)

(a) 2-methyl pentane $\xrightarrow{\text{Cl}_2}$ five types of monochlorinated compounds

(b) 2,2 -dimethylbutane $\xrightarrow{\text{Cl}_2}$ three types of monochlorinated compounds

(c) 2,3 -dimethylbutane $\xrightarrow{\text{Cl}_2}$ two types of monochlorinated compounds

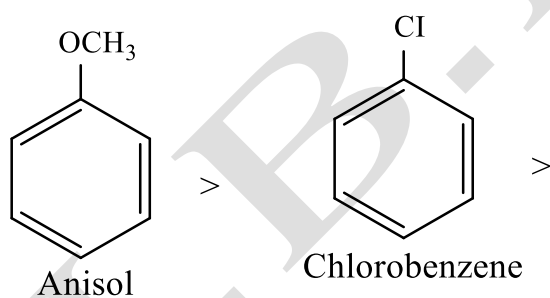
(d) n-hexane $\xrightarrow{\text{Cl}_2}$ three types of monochlorinated compounds

70 (a)

-OCH₃ (methoxy group) is an electron releasing group. It increases electron density at benzene nucleus due to resonance effect(+ R effect). Hence, makes anisole more reactive than benzene towards electrophiles.

In case of aryl halides, halogens are moderately deactivating because of their strong -I effect and +R effect thus, overall electron density on benzene ring decreases. It makes further substitution difficult. -NO₂ group is electron withdrawing group. It decreases the electron density in benzene nucleus due to strong -I- effect. Hence, makes nitrobenzene less reactive.

Therefore, overall reactivity of these three compounds towards electrophiles decreases in the following order :



71 (b)

Reaction of 4-octyne and H₂ can be arrested at the alkene stage only by using palladium partially inactivated with trace of quinolone. The product is cis-alkene.

72 (d)

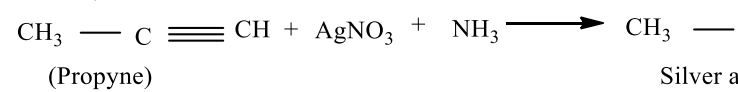
The two compounds should react differently with the reagent used to distinguish them.

∴ Propyne (CH₃ - C ≡ CH) and propene (CH₃CH = CH₂) both are unsaturated compounds.

∴ Both of them decolourise alk. KMnO₄ and Br₂ in CCl₄ and both of them give addition reaction with

conc. H₂SO₄.

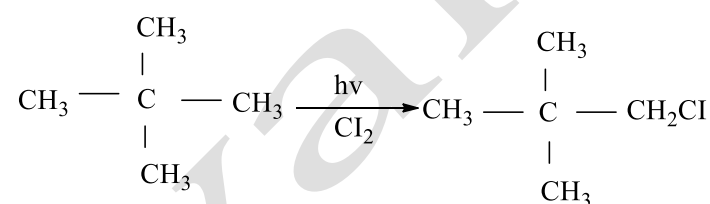
∴ Propyne reacts with AgNO₃ in NH₃ to give white ppt. of silver acetylide and propene does not react with it. (only terminal alkynes react with AgNO₃ in NH₃).



CH₃ - CH = CH₂ + AgNO₃ + NH₃ → No reaction

73 (d)

In neo-pentane, all H are equivalent.



74 (a)

Carbon twenty (C₂₀) to carbon thirty (C₃₀) range of carbon atoms in alkanes found in paraffin wax. It is a soft colourless solid derived from petroleum, coal or shale oil that consists of a mixture of hydrocarbon molecules. It is used in candles, wax paper, polishes, cosmetics and electrical insulators.

77 (a)

has 1- ethyl-3-methylbutyl as the correct IUPAC name.

78 (d)

Statement I, II and III are correct.

79 (b)

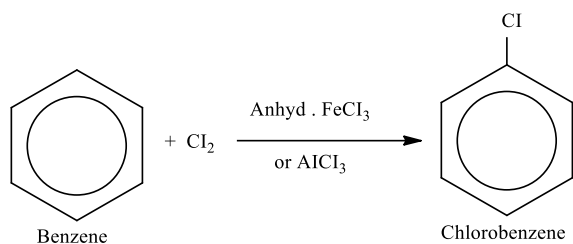
Presence of electron releasing group (or activating group) increases the electron density at benzene nucleus. Therefore, electrophile will attack benzene nucleus easily. But the presence of electron withdrawing group like -NO₂ decreases the electron density at benzene ring. Therefore, electrophile will attack benzene nucleus with difficulty.

The order of reactivity towards electrophile, E⁺ in the order of their decreasing relative reactivity is Toluene > p-CH₃ - C₆H₄ - NO₂ > chlorobenzene > p-nitrochlorobenzene > 2,4-dinitrochlorobenzene

80 (a)

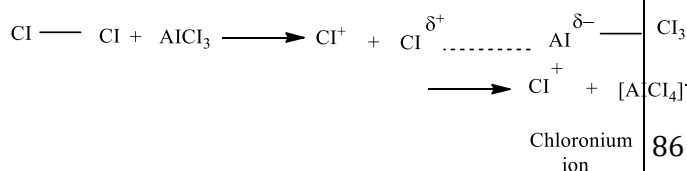
Arenes on treatment with chlorine in presence of Lewis acid catalyst, ferric chloride or aluminium chloride and in the absence of light undergoes

halogenation. It involves electrophilic substitution reaction.

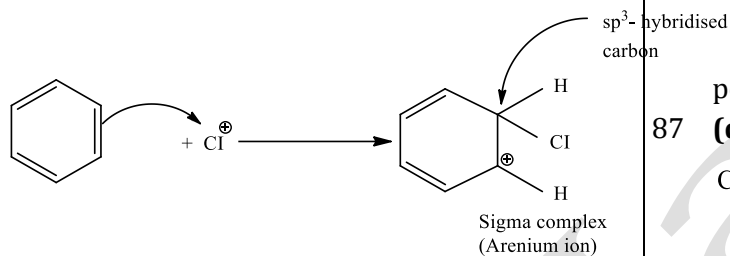


Mechanism of electrophilic substitution is as follows :

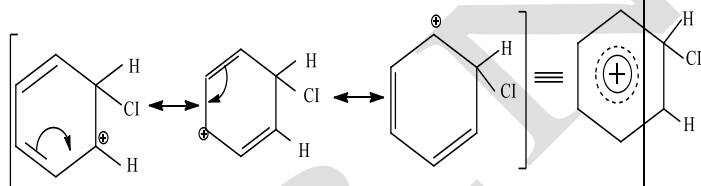
Step I Generation of an electrophile.



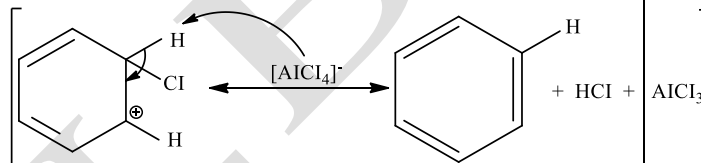
Step II Formation of carbocation (arenium ion)



The arenium ion gets stabilized by resonance



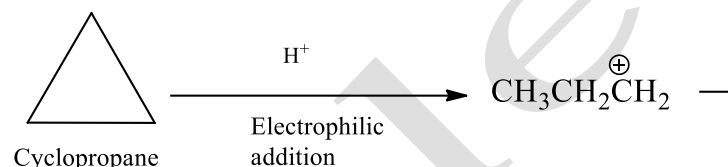
Step III Removal of proton.



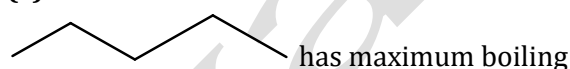
reaction is too slow that it requires a catalyst . It is because of high electronegativity of fluorine. Reactivity decreases with decrease in electronegativity and electronegativity decreases down the group.

85 (c)

To minimize strain, there is opening of ring (bond angle changes from 60° to $109^\circ 28'$) and electrophilic addition of H^+ takes place.

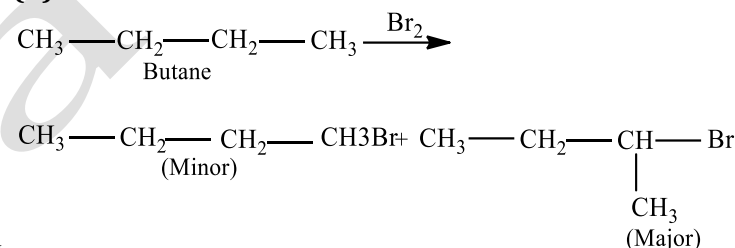


86 (c)



point and has maximum melting point.

87 (d)



As 2° free radical is more stable than 1° free radical.

88 (b)

Only n-octane has the longest chain of eight carbon atoms and hence, has the highest boiling point.

81 (d)

n-hexane can be easily sulphonated.

83 (a)

The order of stability for the conformations of n-butane is
anti > gauche > eclipsed (partial) > eclipsed (full)

I II III IV

84 (a)

Rate of reaction of alkanes with halogens is

$\text{F}_2 > \text{Cl}_2 > \text{Br}_2 > \text{I}_2$

Alkane react with F_2 vigorously and with I_2 the

N.B. Navale