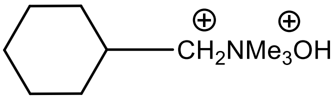
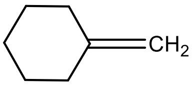
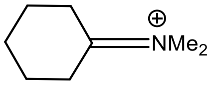
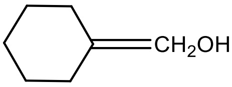
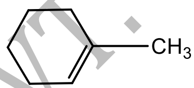
HYDROCARBONS

CHEMISTRY

Single Correct Answer Type

1. Thermal decomposition of

 gives

a) 
b) 
c) 
d) 

2. Which of the following is not a petroleum product?
a) Petrol
b) Paraffin wax
c) Bees wax
d) Kerosene

3. A knocking sound is produced more in the engine when the fuel contains mainly:
a) n-alkanes
b) CO_2
c) CO
d) Lubricating oil

4. Reaction of HBr with propene in presence of peroxides gives:
a) Isopropyl bromide
b) 3-bromopropane
c) Allyl bromide
d) n-propyl bromide

5. The next higher homologue of C_6H_{14} is:
a) C_7H_{14}
b) C_7H_{16}
c) C_7H_{10}
d) C_7H_{12}

6. The reaction conditions used for converting 1,2-dibromopropane to propylene are
a) KOH, alcohol/Δ
b) KOH, water/Δ
c) Zn, alcohol/Δ
d) Na, alcohol/Δ

7. A gas formed by the action of alcoholic KOH on ethyl iodide, decolourises alkaline $KMnO_4$. The gas is
a) C_2H_6
b) CH_4
c) C_2H_2
d) C_2H_4

8. Alkyne, C_7H_{12}, when reacted with alkaline $KMnO_4$ followed by acidification with HCl gives a mixture of $(CH_3)_2CHCOOH + CH_3CH_2COOH$,The alkyne C_7H_{12} is
a) 3-hexyne
b) 2-methyl-2-hexene
c) 2-methyl-3-hexene
d) 3-methyl-2-hexyne

9. The relationship between acetylene and benzene is comparable to the relationship between propyne and
a) Dimethyl benzene
b) Neoprene
c) Propyl benzene
d) Mesitylene

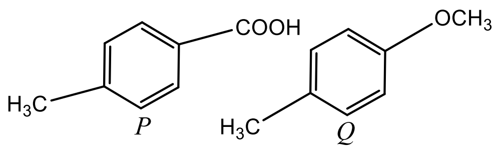
10. Complete oxidation of one mole of an alkane forms 3 moles ofCO_2. The alkane is
a) CH_4
b) C_2H_6
c) C_3H_8
d) C_6H_{14}

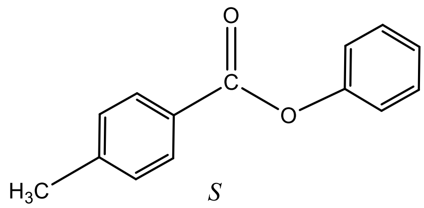
11. The ozonolysis of ethylene, acetylene and propylene respectively gives:
a) HCHO, CHO— CHO and $CH_3CHO + HCHO$
b) CHO— CHO, HCHO and CH_3CHO
c) HCHO + CH_3CHO, CHO— CHO and HCHO
d) CHO— CHO, CH_3CHO + HCHO and HCHO

12. The reaction, $CH_2 = CH_2 + CH_3COCl \xrightarrow{AlCl_3}$ gives the product:
a) $CH_3COCH_2CH_2Cl$
b) $CH_3.CH_2.CH_2Cl$
c) $CH_3COCH_2.CH_2COCH_3$
d) $ClCH_2CH_2Cl$

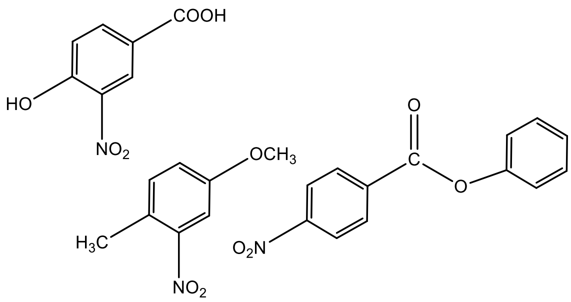
13. Alkyl halides react with dialkyl copper reagents to give
a) Alkenyl halides
b) Alkanes
c) Alkyl copper halides
d) Alkenes

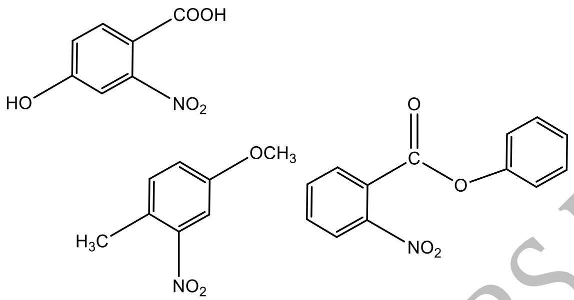
14. The gas which is used for the artificial ripening of fruits is:
a) C_2H_6 b) C_2H_2 c) C_2H_4 d) Marsh gas
15. $CH_3—C \equiv CH$ reacts with HCl to give:
a) 2,2-dichloropropane b) 1,1-dichloropropane c) 1,2-dichloropropane d) 1-chloropropene
16. $CH_3CH_3 + HNO_3 \xrightarrow{675\text{ K}} ?$
a) $CH_3CH_2NO_2$
b) $CH_3CH_2NO_2 + CH_3NO_2$
c) $2CH_3NO_2$
d) $CH_2 = CH_2$
17. Which of the following is produced when coal is subjected to destructive distillation?
a) Methane b) Ethane c) Acetylene d) Coal gas
18. The product of the following reaction are:
$CH_3C\equiv C.\ CH_2CH_3 \xrightarrow[\text{(ii) Hydrolysis}]{\text{(i) } O_3} ?$
a) $CH_3COOH + CH_3COCH_3$
b) $CH_3COOH + CH_3CH_2COOH$
c) $CH_3CHO + CH_3CH_2CHO$
d) $CH_3COOH + CO_2$
19. Methyl bromide heated with zinc in closed tube produces:
a) Methane b) Ethane c) Ethylene d) Methanol
20. Aqueous solution of an organic compound, $'A'$ on electrolysis liberates acetylene and CO_2 at a node. $'A'$ is
a) Potassium acetate
b) Potassium succinate
c) Potassium citrate
d) Potassium maleate
21. The reaction of alkanes with halogen is explosive in the case of:
a) F_2 b) Cl_2 c) I_2 d) Br_2
22. Which of the following is unsymmetrical alkene?
a) 1-butene b) 2-hexene c) 1-pentene d) All of these
23. Which of the statement is wrong for alkanes?
a) Most of the alkanes are soluble in water
b) Their density is always less than water
c) At room temperature some alkanes are liquid, some solid and other are gases
d) All alkanes burn
24. Propane cannot be prepared from which reaction?
a) $CH_3 - CH = CH_2 \xrightarrow[OH^-]{B_2H_6}$
b) $CH_3CH_2CH_2I \xrightarrow[P]{HI}$
c) $CH_3CH_2CH_2COONa \xrightarrow{NaOH/CaO,\Delta}$
d) None of the above
25. Nitrating mixture is
a) Fuming nitric acid
b) Mixture of conc. H_2SO_4 and conc. HNO_3
c) Mixture of nitric acid and anhydrous zinc chloride
d) None of the above
26. Cyclohexene on reaction with OsO_4 followed by reaction with $NaHSO_3$ gives
a) $cis -$ diol b) $trans -$ diol c) Epoxy d) Alcohol
27. Al_4C_3 on hydrolysis yields
a) Nitrogen gas b) Methane gas c) Hydrogen gas d) Carbon dioxide
28. The compounds P, Q and S

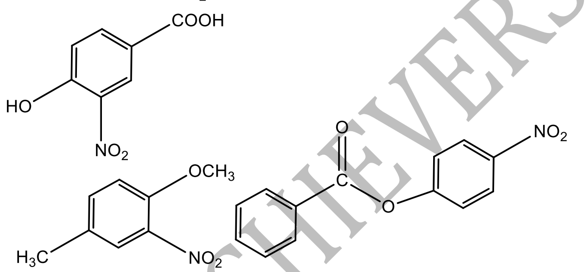


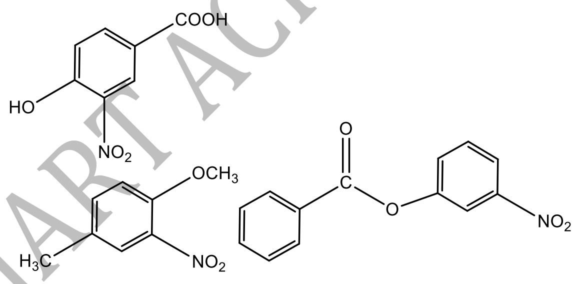


where separately subjected to nitration using HNO_3/H_2SO_4 mixture. The major product formed in each case respectively, is

a) 

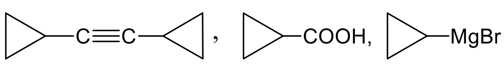
b) 

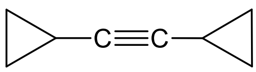
c) 

d) 

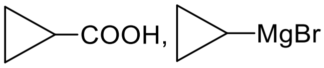
29. Which of the following is not a mixture of hydrocarbons?
a) Candle wax b) Kerosene c) Vegetable oils d) Paraffin oil

30. $C_8H_{10}(A) \xrightarrow{O_3/H_2O} \text{acid}(B)$
$C_3H_5MgBr(C) \xrightarrow{CO_2, H_3O^+} \text{acid } B$
Identify A, B and C

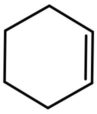
a) 

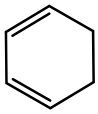
b)  , $CH_3CH_2CH_2COOH$,
$CH_2{=}CH{-}CH_2MgBr$

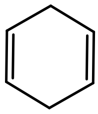
c) $CH_3 - CH_2 - CH_2 - CH_3, CH_3CH_2CH_2COOH, CH_2 = CH - CH_2MgBr$

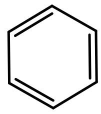
d) $CH_3CH_2CH_2CH_3$, 

31. Which of the following has the maximum heat of hydrogenation?

a) 

b) 

c) 

d) 

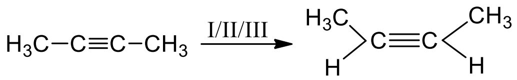
32. $CH_3CH_2CH_3 \xrightarrow{400-600°C} X + Y, X$ and Y are

a) Hydrogen and methane
b) Hydrogen and ethylene
c) Ethylene and methane
d) Any of these

33. Position of double bond in alkenes is identified by

a) Ozonolysis
b) Bromine water
c) Ammonical silver nitrate
d) None of these

34. Consider the following reaction



I. H_2/Ni_2B
II. $H_2/Pd - CaCO_3$ in quinoline
III. Na/NH_3 or $LiAIH_4$

This reaction takes place by

a) I or II
b) I or III
c) II or III
d) I, II or III

35. Which of the following reagent can distinguish between 1-butyne and 2-butyne?

a) Aqueous NaOH
b) Bromine water
c) Fehling's solution
d) Ammoniacal $AgNO_3$

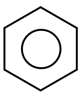
36. CH_4 is formed when:

a) Sodium acetate is heated with soda lime
b) Iodo methane is reduced
c) Aluminium carbide reacts with water
d) All of the above

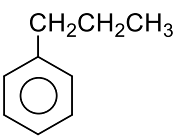
37. Reaction of HBr with propene in the presence of peroxide gives

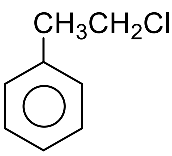
a) *iso*-propyl bromide
b) 3-bromo propane
c) Allyl bromide
d) *n*-propyl bromide

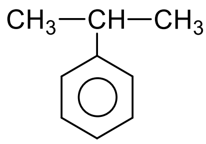
38. Predict structure of X in following reaction

 $+ CH_3CH_2CH_2Cl \xrightarrow{AlCl_3} X$ is

a) 

b) 

c) 

d) 

39. The middle oil fraction of coal-tar distillation contains:

a) Benzene
b) Anthracene
c) Naphthalene
d) Xylene

40. On halogenation, an alkane (C_5H_{12}) gives only one monohalogenated product. The alkane is

a) *n*-pentane
b) 2-methyl butane
c) 2, 2-dimethyl propane
d) Cyclopentane

41. Acrylic emulsion in paints is a polymer of:

a) $CH_2 = CH - COOCH_3$
b) $CH_3 - CH = CH - COOCH_3$
c) $CH_2 = CH - COOH$

d) $CH_2 = C(CH_3) - COOCH_3$

42. A hydrocarbon X adds on one mole of hydrogen to give another hydrocarbon and decolourised bromine water. X react with $KMnO_4$ in presence of acid to give two mole of the same carboxylic acid. The structure of X is:
a) $CH_3CH = CHCH_2CH_2CH_3$
b) $CH_3CH_2CH = CHCH_2CH_3$
c) $CH_3CH_2CH_2—CH = CHCH_3$
d) $CH_2 = CH—CH_2CH_2CH_3$

43. An anaesthetic narcylene is commercial name of:
a) C_2H_4 b) C_2H_2 c) $CHCI_3$ d) ether

44. By which one of the following compounds both CH_4 and $CH_3 - CH_3$ can be prepared in one step?
a) CH_3I b) CH_3OH c) CH_3CH_2I d) C_2H_5OH

45. What volume of methane (NTP) is formed from 8.2 g of sodium acetate by fusion with sodalime?
a) 10 litre b) 11.2 litre c) 5.6 litre d) 2.24 litre

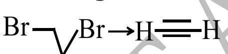
46. When methyl iodide is treated with sodium in ethereal solution, it gives
a) Methane b) Ethane
c) Methyl sodium iodide d) Sodium methoxide

47. 2-methylpentene 2 on ozonolysis will give:
a) Only propanal
b) Propanal and ethanal
c) Propanone-2 and ethanal
d) Propanone-2 and propanal

48. The reaction,
$$2RC\equiv CCu \xrightarrow[\text{Pyridine}]{(CH_3COO)_2Cu} R—C\equiv C-C\equiv C-R$$
a) Eglinton's reaction
b) Glaser reaction
c) Gomberg-Beckmann's reaction
d) Leuckart reaction

49. 2-Hexyne gives *trans*-2-hexene on treatment with:
a) Li/NH_3 b) $Pd/BaSO_4$ c) $LiAlH_4$ d) Pt/H_2

50. Which of the following will give three mono-bromo derivatives?
a) $CH_3CH_2CH_2CH(CH_3)CH_3$ b) $CH_3CH_2C(CH_3)_2CH_3$
c) $CH_3CH_3(CH_3)CH(CH_3)CH_3$ d) All the above can give

51. The reagent for the following conversion

is/are :
a) Alc. KOH b) Alc. KOH followed by $NaNH_2$ c) Aqueous KOH followed by $NaNH_2$ d) Zn/CH_3OH

52. In a reaction if half of the double bond is broken and two new bonds are formed, this is a case of:
a) Elimination b) Addition c) Displacement d) Rearrangement

53. Which represents a cyclic alkane?
a) C_3H_6 b) C_3H_8 c) C_8H_{10} d) C_8H_{12}

54. $CH_3 - CH_2 - CH_2 - CH_3 \xrightarrow[HBr]{AlCl_3}$ Product
Product in the above reaction is

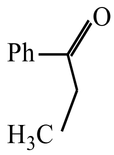
a) $CH_3 - CH - CH_2 - CH_3$ with Br on the second carbon (CH)

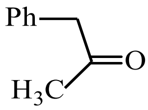
b) $CH_3 - CH - CH_3$ with CH_3 on the CH

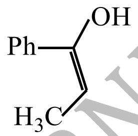
c) $CH_3 - CH_2 - CH_2$
||

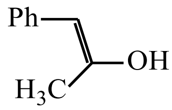
d) All of these

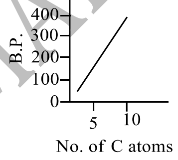
BrBr

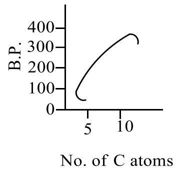
55. According to Huckel's rule an aromatic compound must possess
    a) $(4n+1)\pi$-electrons   b) $(4n+2)\pi$-electrons
    c) $4n$ π-electrons   d) $(4n+3)\pi$-electrons
56. Acetylene gives:
    a) White ppt. with $AgNO_3$ and red ppt. with Cu_2Cl_2
    b) White ppt. with Cu_2Cl_2 and red ppt. with $AgNO_3$
    c) White ppt. with both
    d) Red ppt. with both
57. 1,1,2,2-tetrabromoethane on heating with Zn powder in alcohol finally gives:
    a) Methane   b) Ethane   c) Ethyne   d) Ethene
58. The carbide which reacts with water to form ethyne is
    a) CaC_2 b) SiC   c) Mg_2C_3 d) Al_4C_3
59. What is the product when 2-butyne is treated with liquid NH_3 in presence of lithium?
    a) n-butane   b) cis-2-butene   c) $trans$-2-butene   d) 1-butene
60. $Ph—C\equiv C—CH_3 \xrightarrow{Hg^{2+}/H^+} A$. A is:
    a) 

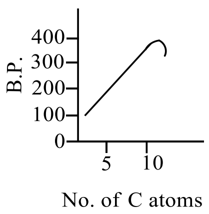
    b) 

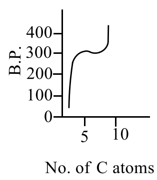
    c) 

    d) 

61. 1-butyne on reaction with hot alkaline $KMnO_4$ gives:
    a) $CH_3CH_2CH_2COOH$
    b) $CH_3CH_2COOH + CO_2$
    c) CH_3CH_2COOH
    d) $CH_3CH_2COOH + HCOOH$
62. Which statement is not correct in case of ethane?
    a) It can be catalytically hydrogenated
    b) When burnt produces CO_2 and H_2O
    c) It is homologue of isobutane
    d) It can be chlorinated with chlorine
63. CH_3COCH_3 can be converted to $CH_3CH_2CH_3$ by the action of
    a) HNO_3 b) HIO_3 c) H_3PO_3 d) HI
64. When ethyl chloride and alcoholic KOH are heated, the compound obtained is
    a) C_2H_4 b) C_2H_2 c) C_6H_6 d) C_2H_6
65. Which of the following will react with sodium metal?
    a) Ethene   b) Propyne   c) But-2-yne   d) Ethane
66. When the boiling point of the first ten normal alkanes are plotted, the graph looks like:
    a) 

    b) 

    c) 

    d) 

67. Which is generally used as reducing agent in organic chemistry?
    a) Zn+HCl   b) $Zn + CH_3COOH$ c) $Zn/Hg + HCl$ d) $Na + C_2H_5OH$
68. Alkynes can be reduced to alkenes by hydrogenation in presence of:
    a) Raney Ni   b) Anhy. $AlCl_3$ c) Pd   d) Lindlar's catalyst
69. Which reagent distinguishes ethylene from acetylene?
    a) Aqueous alkaline permanganate
    b) Chlorine dissolved in carbon tetrachloride

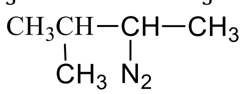
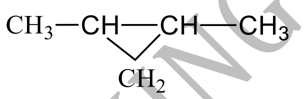
c) Ammoniacal cuprous chloride
d) Concentrated sulphuric acid

70. By heating tetraethyl ammonium hydroxide, the product formed are:
a) C_2H_4
b) $(C_2H_5)_3N$
c) H_2O
d) All of these

71. Addition of ICl on propene gives the product:
a) $CH_3CHClCH_3$ b) CH_3CHICH_2Cl c) $CH_3CHClCH_2I$ d) $CH_3CHClCH_2Cl$

72. Which of the following alkenes gives on acetaldehyde on ozonolysis?
a) Ethene b) Propene c) 1-butene d) 2-butene

73. In the following sequence of reactions, the alkene affords the compound 'B'
$CH_3CH = CHCH_3 \xrightarrow{O_3} A \xrightarrow{H_2O} B$
The compound B is
a) CH_3CH_2CHO b) CH_3COCH_3 c) $CH_3CH_2COCH_3$ d) CH_3CHO

74. $CH_3CH = CH - CH_3 + CH_2N_2 \rightarrow A; A$ is
a) 
b) 
c) Both (a) and (b) d) None of these

75. Direct fluorination of alkanes is not made because:
a) Reaction does not occur
b) Alkane fluorides are not formed
c) Reaction occurs violently
d) None of the above

76. On monochlorination of n-pentane, the number of isomers formed is:
a) 4 b) 3 c) 2 d) 1

77. Which of the following is the predominant product in the reaction of HOBr with propene?
a) 2-bromo-1-propanol b) 3-bromo-1-propanol
c) 2 − bromo − 2 − propanol d) 1-bromo-2-propanol

78. Acetylene is prepared industrially by passing electric discharge through graphite electrodes in the atmosphere of:
a) Air b) N_2 c) H_2 d) CO_2

79. The reaction of an aromatic halogen compound with an alkyl halide in presence of sodium in ether is called
a) Sandmeyer's reaction b) Wurtz reaction
c) Kolbe reaction d) Wurtz-Fittig reaction

80. How many isomeric forms of pentane exist?
a) 3 b) 2 c) 5 d) 6

81. Alkanes mainly show reactions involving:
a) Carbonium formation
b) Ionic elimination
c) Ionic formation
d) Heat/photochemical substitution

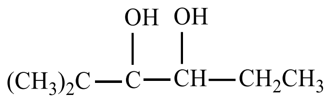
82. Ozonolysis of an organic compound A produces acetone and propionaldehyde in equimolar mixture. Identify A from the following compounds.
a) 2-methyl-1-pentene b) 1-pentene
c) 2-pentene d) 2-methyl-2-pentene

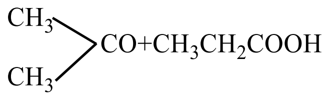
83. Using anhydrous $AlCl_3$ as catalyst, which one of the following reactions produce

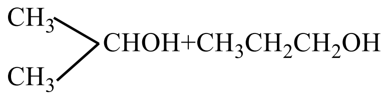
ethylbenzene(PhEt)?

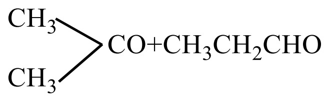
a) $H_3C - CH_2OH + C_6H_6$
b) $CH_3 - CH = CH_2 + C_6H_6$
c) $H_2C = CH_2 + C_6H_6$
d) $H_3C - CH_3 + C_6H_6$

84. On vigorous oxidation by alkaline permanganate solution $(CH_3)_2C = CH— CH_2CHO$ gives:

a) 

b) 

c) 

d) 

85. The compound that is most reactive towards electrophilic nitration is

a) toluene b) benzene c) benzoic acid d) nitrobenzene

86. 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) Propene b) 1-butene c) 2-butene d) Ethene

87. The conversion of propene to propanol is … type of reaction.

a) Hydrogenation b) Hydration c) hydrolysis d) Dehydrogenation

88. When n-hexane/n-heptane is passed through Cr_2O_3 supported over alumina at 600°C gives:

a) Hexane b) Hexyne c) Benzene, Toluene d) None of these

89. If $20cm^3$ of methane (CH_4) is burnt using $50cm^3$ of oxygen. The volume of the gases left after cooling to room temperature will be:

a) $60cm^3$ b) $70cm^3$ c) $30cm^3$ d) $50cm^3$

90. An alkane of mol. weight 72 gives on monochlorination only one product. Name the alkane:

a) 2-methylbutane b) n-pentane c) 2,2-dimethylpropane d) None of these

91. The number of disubstituted products of benzene is

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

92. The treatment of $R'MgX$ with $RC \equiv CH$ produces

a) RH b) $R'H$ c) $R - R$ d) $R - R'$

93. Electrolysis of an aqueous solution of sodium acetate, yields

a) Ethane b) Ethene c) Ethyne d) Propane

94. Propyne on passing through red hot copper tube forms

a) benzene b) Toluene c) Mesitylene d) None of these

95. Among the following, the compound that be most readily sulphonated is

a) Benzene b) Nitrobenzene c) toluene d) chlorobenzene

96. Propylene on hydrolysis with sulphuric acid forms

a) n-propyl alcohol b) Isopropyl alcohol c) Ethyl alcohol d) Butyl alcohol

97. What is the product formed when acetylene reacts with hypochlorous acid?

a) CH_3COCl b) $ClCH_2CHO$ c) Cl_2CHCHO d) $ClCH_2COOH$

98. When CaC_2 was hydrolysed a gas was obtained. It had a garlic odour due to phosgene present as impurity. The gas was passed through ammoniacal solution of Cu_2Cl_2, a red ppt. was obtained. The gas was:

a) Ethylene b) Propyne c) Acetylene d) Ethane

99. Alkenes undergo

a) Addition reactions
b) Substitution reactions
c) Both (a) and (b)

d) None of these

100. Aromatic compound among other things should have a π-electron cloud containing $(4n+2)\pi$ electrons where, n cannot be

a) $\frac{1}{2}$ b) 3 c) 2 d) 1

101. Polymer of propyen is:

a) Polyethylene b) Polythene c) Benzene d) Mesitylene

102. Which of the following has the least octane number?

a) Octane b) Cetane c) 2,2,4-trimethylpentane d) n-heptane

103. Name the reaction $C_3H_6 \longrightarrow C_3H_8$:

a) Alkylation b) Cracking c) Hydrogenation d) Dehydrogenation

104. The tar which is used to make roads is a solid known as:

a) Pitch b) Paraffin wax c) Coal d) None of these

105. Thermal decomposition of alkanes in the absence of air is called

a) Cracking b) Oxidation c) Combustion d) Hydrogenation

106. The conditions for aromaticity is

a) Molecule must have clouds of delocalised π-electrons

b) Molecule must contain $(4n+2)\pi$-electrons

c) Both (a) and (b)

d) None of the above

107. C_2— C_3 bond length in but-1,3-diene is:

a) 1.46Å b) 1.20Å c) 1.39Å d) 1.34Å

108. For synthesis of 1-butene, CH_3Mgl should be treated with

a) Propene b) 2-chloropropene c) Allyl chloride d) Ethyl chloride

109. The highest boiling point is expected for

a) n-butane b) *iso*-octane

c) n-octane d) 2,2,3,3-tetramethyl butane

110. When butane-1 is mixed with excess of bromine, the expected reaction product is:

a) Hydrogen bromide b) Butylene gas c) 1,2-dibromobutane d) Perbromobutane

111. An alkene having molecular formula C_9H_{18} on ozonolysis gives 2, 2-dimethyl propanal and 2-butanone. The alkene is

a) 2,2,2-trimethyl-3-hexene b) 2,2,6-trimethyl-3-hexane

c) 2,3,4-trimethyl-2-hexene d) 2,2,4-trimethyl-3-hexene

112. Propene on reaction with diazomethane in presence of UV radiations gives:

a) Cyclopropane b) Methyl cyclopropane c) Butane d) Butene

113. Both methane and ethane may be obtained by a suitable one-step reaction from

a) CH_3I b) C_2H_5I c) CH_3OH d) C_2H_2OH

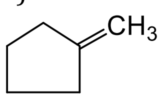
114. The product (s) obtained *via* oxymercuration $(HgSO_4 + H_2SO_4)$ of but-1-yne would be

a) $CH_3CH_2COCH_3$ b) $CH_3CH_2CH_2CHO$

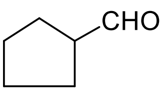
c) $CH_3CH_2CHO + HCHO$ d) $CH_3CH_2COOH + HCOOH$

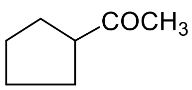
115. Alkene-1 on hydroboration followed with action of H_2O_2 gives:

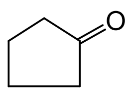
a) Alkanol-2 b) Alkanol-1 c) Alkanal d) Alkanone

116. 

on ozonolysis gives

a) 

b) 

c) 

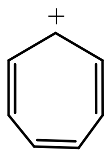
+ HCHO d) None of these

117. The compound 'C' in the following reaction is

$C_7H_7 \xrightarrow{3Cl_2/\Delta} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$

a) o-bromotoluene
b) m-bromotoluene
c) p-bromotoluene
d) 3-bromo-2,4,6-trichlorotoluene

118. Iodination of alkane is made in presence of:
a) $KMnO_4$
b) HgO or HIO_3
c) $K_2Cr_2O_7$
d) None of these

119. Pick out the wrong statement.
a) Toluene shows resonance
b)  is non-aromatic.
c) The hybrid state of carbon in carbonyl group is sp^2.
d) The hyperconjugative effect is known as no bond resonance.

120. An alkene on vigorous oxidation with $KMnO_4$ gives only acetic acid. The alkene is
a) $CH_3CH_2CH = CH_2$
b) $CH_3CH = CHCH_3$
c) $(CH_3)_2C = CH_2$
d) $CH_3CH = CH_2$

121. A hydrocarbon reacts with hypochlorous acid to give 2-chloroethanol. The hydrocarbon is:
a) Methane
b) Ethylene
c) Acetylene
d) Ethane

122. The angle strain in cyclobutane is
a) $24°44'$
b) $29°16'$
c) $19°22'$
d) $9°44'$

123. 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?
a) Only methyl chloride will be formed
b) Only chloroform will be formed
c) Only CCl_4 will be formed
d) Only methylene dichloride will be formed

124. Aromatization of n-heptane and n-octane gives respectively:
a) Toluene, ethyl benzene
b) Ethyl benzene, toluene
c) Toluene, benzene
d) Benzene, ethyl benzene

125. Which of the following organic compounds exhibit acidic character?
a) $H_3C - C \equiv CH$
b) $H_3C - C \equiv C - CH_3$
c) $H_2C = CH_2$
d) $H_3C - CH_3$

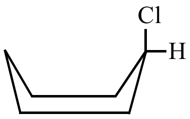
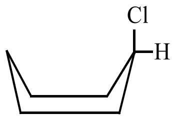
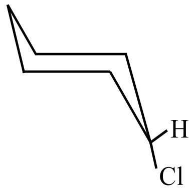
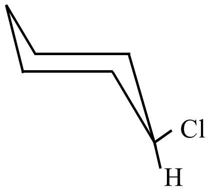
126. Sodium formate on heating with soda lime gives:
a) CH_4
b) CO_2
c) H_2
d) All of these

127. Which of the following can be used for preparation of propane?
a) $CH_3CH = CH_2 \xrightarrow[2.AgNO_3/NaOH]{1.B_2H_6}$
b) $CH_3CH_2CH_2Cl \xrightarrow[2.H_2O_2]{1.Mg/ether}$
c) $CH_3CH_2CH_2I \xrightarrow{HI/\Delta\ 150°C}$
d) $CH_3CH_2CH_2COONa \xrightarrow[\Delta]{NaOH(CuO)}$

128. The marsh gas detector used by miners works on the principle of:
a) Difference in the rates of diffusion of gases
b) Avogadro's hypothesis
c) Gay-Lussac's law of gaseous volumes
d) Berzelius hypothesis

129. The compound with highest boiling point.
a) n-nexane
b) n-pentene
c) 2,2-dimethyl propane
d) 2-methyl butane

130. The most stable conformation of chlorocyclohexane at room temperature is:

a)  b)  c)  d) 

131. Acetylene is not used in making:
a) Textile yarn b) PVC c) Glucose d) Drugs

132. An aromatic compound 'X' with molecular formula C_8H_{10} produces on nitration one mononitro derivative and three dinitro derivatives. Compound 'X' would be
a) Ethyl benzene b) m-xylene c) o-xylene d) p-xylene

133. That acetylene is a linear molecule is shown by
a) Its $C \equiv C$ bond distance being 1.21 Å
b) Its $C - H$ bond distance being 1.08 Å
c) Its$H - C - C$ bond angle being 180°
d) All of the above

134. Benzene on treatment with a mixture of conc. HNO_3 and conc. H_2SO_4 at 100°C gives
a) Nitrobenzene b) m-dinitrobenzene c) p-dinitrobenzene d) o-dintrobenzene

135. Which of the following differs with the other three?
a) Naphthalene b) Ethylene c) Toluene d) Xylene

136. A saturated hydrocarbon is shown by C_nH_{10} The value of carbon atom 'n' in this compound is:
a) 2 b) 4 c) 5 d) 6

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

138. $CH_2 = CH_2$ reacts with HCI to form:
a) $CH_2CH_2Cl_2$ b) CH_2ClCH_3 c) CH_2ClCH_2Cl d) CH_3CHCl_2

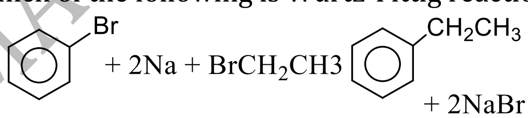
139. Reduction of carbonyl compounds to alkanes with $NH_2 — NH_2$ and NaOH is called:
a) Clemmensen reduction
b) Wolff-Kishner reduction
c) Wurtz's reaction
d) Pondrof Verley reduction

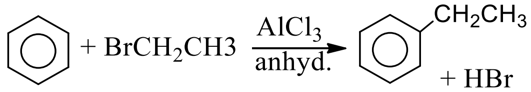
140. The compound which cannot decolourise alkaline $KMnO_4$:
a) Acetylene b) Ethanol c) Ethanal d) Ethane

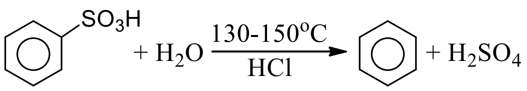
141. Which one of the following can distinguish propyne from propene?
a) Br_2 water b) Ammoniacal $AgNO_3$ c) Aq. $KMnO_4$ d) Dil. H_2SO_4

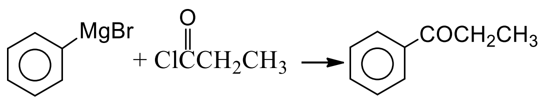
142. The reaction of ethene with oxygen in presence of a silver catalyst gives:
a) Ethylene glycol b) Ethylene epoxide c) Glyoxal d) Acetaldehyde

143. 4-nitrotoluene $\xrightarrow[H_2SO_4]{K_2Cr_2O_7}$ product. The product in the reaction is
a) Benzoic acid b) 4-nitrobenzene c) 4-nitrobenzoic acid d) 2-nitrobenzoic acid

144. Which of the following is Wurtz-Fittig reaction?
a) 

b) 

c) 

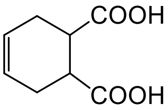
d) 

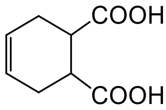
145. Ozonolysis can be used to detect:
a) 1-butene and 2-butene
b) Branched alkene from unbranched alkene
c) Location of double bond/triple bond in carbon chain

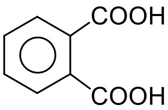
d) All are correct

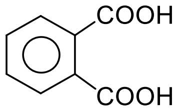
146. $CH_2{=}CH{-}CH{=}CH_2 + \underset{CH-COOH}{\overset{CH-COOH}{\|}} \longrightarrow X$

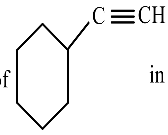
Product X is obtain by reaction R. X and R are

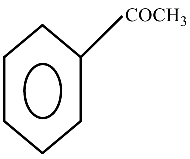
a)  Diels-Alder

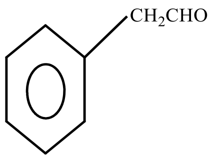
b)  Friedel-Crafts

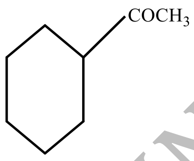
c)  Diels-Alder

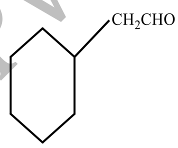
d)  Friedel-Crafts

147. Hydroxylation of  in presence of $H_2SO_4/HgSO_4$ gives:

a) 

b) 

c) 

d) 

148. In which of the following will Kharasch effect operate?

a) $CH_3CH_2CH = CH_2 + HCI$

b) $CH_3CH_2—CH = CH_2 + HBr$

c) $CH_3CH = CH—CH_3 + HBr$

d) $CH_3CH_2CH = CH_2 + HI$

149. In the following reaction, A and B, respectively are

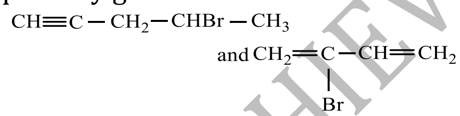
$A \xrightarrow{HBr} C_2H_5Br \xrightarrow{B} A$

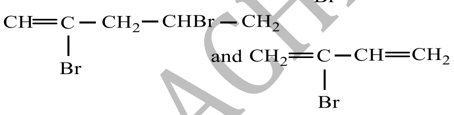
a) C_2H_4, alc. KOH/Δ b) C_2H_5Cl, aq. KOH/Δ c) CH_3OH, aq. KOH/Δ d) C_2H_5, PBr_3

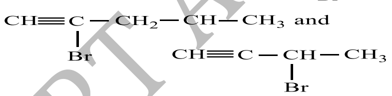
150. Addition of HBr on:

$CH \equiv C—CH_2—CH = CH_2$ and $CH \equiv C—CH = CH_2$

Separately gives:

a) 

b) 

c) 

d) None of the above

151. Compound C_6H_{12} is an:

a) Aliphatic saturated compound

b) Alicyclic compound

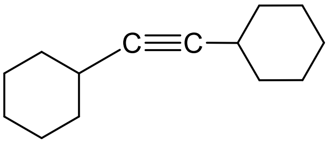
c) Aromatic compound

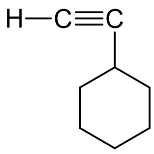
d) Heterocyclic compound

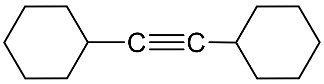
152. A lead compound known as….is used as anti-knock in petroleum industry to increase the efficiency of fuel consumption

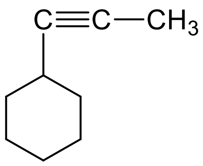
a) $(C_2H_5)_4$ Pb b) $Pb(CH_3COO)_2$ c) $(C_2H_5)_2Pb$ d) $PbCO_3$

153. Which of the following form alkynide?

a) 

b) 

c) 

d) 

154. Which of the following reagents when heated with ethyl chloride, forms ethylene?
a) Aqueous KOH b) Zn/HCl c) Alcoholic KOH d) HI

155. Reduction of 2-methyl-1-bromopropane with metal and acid gives:
a) Butyl bromide b) n-butane c) Isobutene d) None of these

156. Dehydration of 2-butanol yield
a) 1-butene b) 2-butene c) 2-butyne d) Both (a) and (b)

157. Which statement is correct?
a) Knocking decreases the efficiency of an internal combustion engine
b) Knocking cannot be eliminated completely by adding anti-knock compounds
c) The higher the octane number, the better is the quality of fuel
d) All of the above

158. The treatment of $\underset{\displaystyle CH_3}{CH_3\overset{|}{C}}=CHCH_3$ with $NaIO_4$ or boiling $KMnO_4$ produces
$KMnO_4$ produces
a) $CH_3COCH_3 + CH_3COOH$ b) $CH_3COCH_3 + CH_3CHO$
c) $CH_3CHO + CO_2$ d) CH_3COCH_3 only

159. Which of the following reagents will be able to distinguish between 1-butyne and 2-butyne?
a) $NaNH_2$ b) HCl c) O_2 d) Br_2

160. 2-chloro-3-methylbutane is treated with sodium in etherial solution, then it will give
a) 2,4-dimethylhexane b) 3,5-dimethylhexane
c) 2,3,4,5-tetramethylhexane d) 2,6-dimethyloctane

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

162. Which of the following is incorrect? The members of the homologous series of alkanes?
a) Are all straight chain compounds
b) Have the general formula C_nH_{2n+2}
c) Show a regular gradation in physical properties
d) Have similar chemical properties

163. Ammoniacal cuprous chloride will give red precipitate with which one of the following?
a) $CH_3 - C \equiv C - CH_3$ b) $CH_3 - CH = CH_2$
c) $CH_3 - C \equiv CH$ d) $CH_3 - CH = CH - CH_3$

164. Mustard gas is:

a) CH_4 b) C_2H_4 c) $CH_2Cl—CH_2—S—CH_2$-d) None of the above

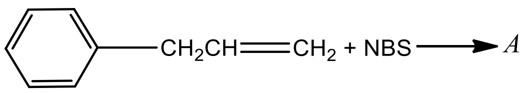
165. During pyrolysis of alkane, C—C bond rather than C—H bond break because:
a) C—C bond is reactive site in alkane
b) C—H bond is reactive site in alkane
c) Bond energy of C—C is lower than C—H bond
d) Energy of activation of C—C bond is very high

166. A mixture of CH_4 and steam on passing over nickel suspension on alumina at 800°C gives:
a) CO only b) H_2 only c) CO and H_2 d) None of these

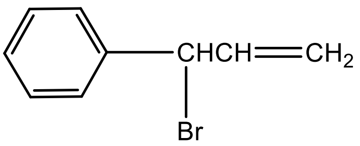
167. A compound $X(C_5H_8)$ reacts with ammoniacal$AgNO_3$ to give a white precipitate, and on oxidation with hot alkaline $KMnO_4$ gives the acid,$(CH_3)_2CHCOOH$. Therefore, X is
a) $CH_2 = CHCH = CHCH_3$ b) $CH_3(CH_2)_2C \equiv CH$ c) $(CH_3)_2CH - C \equiv CH$ d) $(CH_3)_2C = C = CH_2$

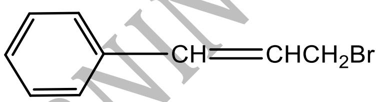
168. What are the products obtained by the ozonolysisof$RCH = CR_1R_2$?
a) $R_1CH_2CH_2R_2$ b) R_2CO c) R_1COR_2 d) None of these

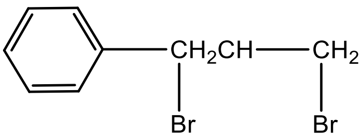
169. Following compound is treated with NBS

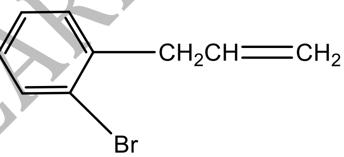


Compound formed A is

a) 

b) 

c) 

d) 

170. The structural formula of the compound which yields ethylene upon reaction with zinc:
a) $CH_2Br—CH_2Br$ b) $CHBr_2—CHBr_2$ c) CHBr=CHBr d) None of these

171. An alkyne combines with a conjugated diene to give an unconjugated cycloalkadiene. The most likely title of this reaction is
a) Schotten-Baumann reaction
b) Hofmann-bromamide reaction
c) Pinacol-Pinacolone rearrangement
d) Deils-Alder reaction

172. The most important method of preparation of hydrocarbons of lower carbon number is:
a) Pyrolysis of higher carbon number hydrocarbons
b) Electrolysis of salts of fatty acids
c) Sabatier-Senderen's reaction
d) Direct synthesis

173. The number of carbon atoms in hydrocarbons of kerosene is in the range of:
a) $C_5—C_7$ b) $C_{12}—C_{16}$ c) $C_1—C_4$ d) $C_{17}—C_{20}$

174. A mixture of 1-chlorobutane and 2-chlorobutane when treated with alcoholic KOH gives
a) 1-butene
b) 2-butene
c) *iso*-butylene
d) Mixture of 1-butene+2-butene

175. Which of the following react with Cl_2 and Br_2 at room temperature and in the absence of diffused sunlight to produce dihalogen derivatives?
a) Cyclobutane b) Cyclopentane c) Cyclohexane d) All of these

176. A compound (X) on ozonolysis followed by reduction gives an aldehyde C_2H_4O and 2-butanone, compound (X) is
a) 3-methyl pentene-2 b) 3-methyl pentene-3 c) 3-methyl hexene-3 d) 3-ethyl pentene-3

177. An octane number 100 is given to:
a) n-hexane b) Iso-octane c) Neopentane d) Neo-octane

178. When butene-1 is mixed with HBr, the major reaction product is:
a) 1,2-dibromobutane b) 1-bromobutane c) 2-bromobutane d) None of these

179. Which cycloalkane has the lowest heat of combustion per CH_2 group?
a) Cyclopropane b) Cyclobutane c) Cyclopentane d) Cyclohexane

180. The order of appearance of the following with rising temperature during the refining of crude oil is:
a) Kerosene, gasoline, diesel
b) Diesel, gasoline, kerosene
c) Gasoline, diesel, kerosene
d) Gasoline, kerosene, diesel

181. $CH_3—C \equiv C—CH_3 \xrightarrow{NaNH_2} X$; what is X?
a) $CH_3—CH_2CH_2CH_3$ b) $CH_3CH_2C \equiv CH$ c) $(CH_3)_2C=CH_2$ d) $CH_2 = C = CH—CH_3$

182. $H_3C—CH(CH_3)—CH=CH_4 + HBr \longrightarrow A$

A(Predominantly) is:
a) $CH_3—C(Br)(CH_3)—CH_2CH_3$
b) $CH_3—CH(Br)—CH(CH_3)—CH_3$
c) $CH_3—CH(CH_3)—CH(Br)—CH_3$
d) $CH_3—CH(CH_3)—CH_2—CH_2Br$

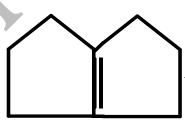
183. The reagent X in the reactions

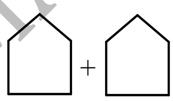
$$(CH_3)_3CCH=CH_2 \xrightarrow[THF]{X} Y \xrightarrow[NaOH]{NaBH_4} (CH_3)_3C—CH(OH)—CH_3$$

a) H_3O^+ b) $(CH_3COO)_2Hg$ c) OH^- d) HCOOH

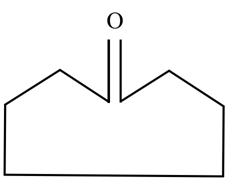
184. Cetane number of diesel fuel increases with the addition of:
a) Decane b) Hexadecane c) Pentane d) Methyl naphthalene

185. Distillation of acetone with concentrated sulphuric acid gives
a) Diacetone alcohol b) Mesityl oxide c) Mesitylene d) Propene-2-ol

186. Ozonolysis of  will give:

a) 

b) $OC—CH_2—CH_2—CH_2—CO$ / $CH_2—CH_2—CH_2$ (ring)

c) 

d) None of the above

187. Soda lime is used extensively in decarboxylation reaction to obtain alkanes. Soda lime is:

a) NaOH b) NaOH and CaO c) CaO d) Na_2CO_3

188. Incomplete combustion of petrol or diesel oil in automobile engines can be best detected by testing fuel gases for the presence of:

a) Carbon dioxide and water vapour

b) Carbon monoxide

c) Nitrogen oxide

d) Sulphur dioxide

189. A compound with molecular formula C_4H_6may contain:

a) A double bond

b) Two triple bonds

c) All single bonds

d) Two double bonds or a triple bond

190. Mustard gas is a

a) Oil gas b) Poisonous gas c) Fuel gas d) Life gas

191. Which of the following is not true?

a) Acetylene has a linear structure

b) Alkynes undergo electrophilic addition, but not nucleophilic addition reactions

c) Alkenes show geometrical isomerism

d) There is sp^3-hybridisation in propane

192. Pure CH_4 can be obtained by:

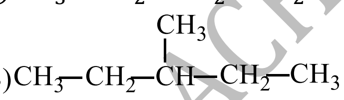
a) $CH_3COONa + BaO$ b) $HCOONa + NaOH$ c) $CH_3COONa +$ Sodalime d) Electrolysis of $HCOONa(aq.)$

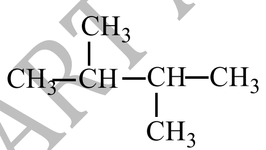
193. Viscosity coefficients of some liquids are given below,

Liquid	η in millipoise at 30°C
$CH_3(CH_2)_3CH_3$	2.11
$CH_3(CH_2)_4CH_3$	2.89
$CH_3(CH_2)_5CH_3$	3.68

The order of viscosity coefficient of the liquids,

(A) $CH_3—CH_2—CH_2—CH_2—CH_2—CH_3$

(B) 

(C) 

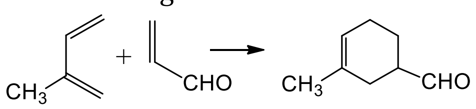
is:

a) The same b) (A)>(B)>(C) c) (A)<(B)<(C) d) (A)>(B)=(C)

194. Action of RMg $X$with vinyl chloride gives:

a) Alkane b) Alkyne c) Alkene d) All of these

195. The following reaction is called



a) Michael addition reaction b) Diels-alder reaction

c) Wolff-Kishner reaction d) None of the above

196. Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono

substituted alkyl halide?
a) Neopentane
b) Isohexane
c) Neohexane
d) *Tertiary*-butyl chloride

197. A *meta* directing functional group is
a) $-COOH$ b) $-OH$ c) $-CH_3$ d) $-Br$

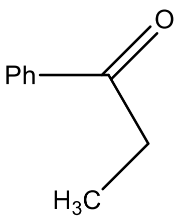
198. Which one of the following compounds is prepared in the laboratory from benzene by a substitution reaction?
a) Glyoxal b) Cyclohexane
c) Acetophenone d) Hexabromocyclohexane

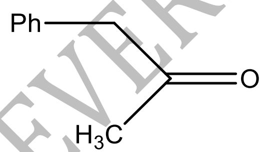
199. Only two isomeric monochloro derivatives are possible for:
a) n-pentane b) 2,4-dimethylpentane c) Benzene d) 2-methylpropane

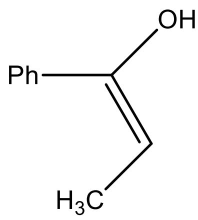
200. Butene-1 may be converted to butane by reaction with
a) $Zn-HCl$ b) $Sn-HCl$ c) $Zn-Hg$ d) Pd/H_2

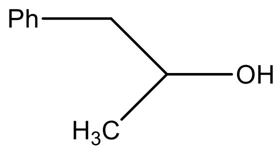
201. Identify 'B' in the following reaction,
$CH_2=CH_2+HCl \xrightarrow{\text{Anhy.AlCl}_3}$
$A+2[H] \xrightarrow[C_2H_5OH]{Zn-Cu} B+HCl$
a) CH_4 b) C_2H_6 c) C_2H_5Cl d) C_2H_5OH

202. The reaction of toluene with chlorine in presence of ferric chloride gives predominantly
a) benzoyl chloride b) m-chlorotoluene
c) Benzyl chloride d) o-and p-chlorotoluene

203. $Ph-C\equiv C-CH_3 \xrightarrow{Hg^{2+}/H^+} A$
The product A is
a) 

b) 

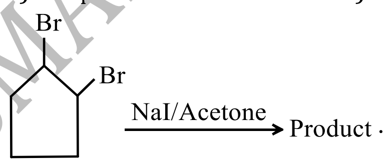
c) 

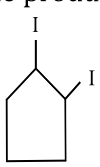
d) 

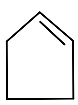
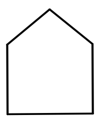
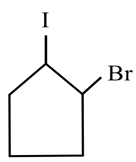
204. During Wurtz reaction, which of the following is sometimes also obtained because of decomposition of free radicals?
a) Alkynes b) Alkenes c) CO_2 d) Alkyl halide

205. Which of the following reagents cannot be used to locate the position of triple bond in $CH_3—C\equiv C—CH_3$?
a) Br_2 b) O_3 c) Cu^+ d) $KMnO_4$

206. Decarboxylation of malonic acid gives:
a) CH_4 b) C_2H_6 c) C_3H_8 d) None of these

207. 

The product of reaction is:
a) 

b) 
c) 
d) 

208. Which compound will react with an aqueous solution of $Ag(NH_3)_2^+OH^-$?
a) $CH_3—C\equiv C—CH_3$ b) $CH_3CH_2C\equiv CH$ c) $CH_3—CH_3$ d) $CH_2=CH_2$

209. Reactivity of tertiary H, secondary H and primary H towards elimination is:
a) Tert. > sec. > pri. b) Sec. > tert. > pri c) Sec. > pri. > tert. d) Pri. > sec. > tert.

210. 1-butyne on hydration gives
a) Butyn-1, 2-diol b) Butan-1-ol c) Butan-2-ol d) Butan-2-one

211. The hydration of propyne in the presence of $HgSO_4/H_2SO_4$ produces
a) HCHO b) CH_3CHO c) CH_3CH_2CHO d) CH_3COCH_3

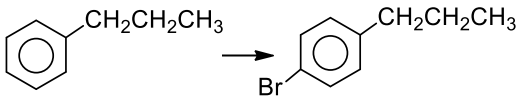
212. The most reactive halogen in the halogenation of alkanes is:
a) Cl_2 b) Br_2 c) I_2 d) All are equal

213. A gas decolourised by $KMnO_4$ solution but gives no precipitate with ammoniacal cuprous chloride is
a) Ethane b) Methane c) Ethene d) Acetylene

214. Indane is:
a) Commercial propane
b) Commercial isobutene and propane mixture
c) Methane, propane mixture
d) Butane, ethane mixture

215. Which reacts with ammoniacal $AgNO_3$?
a) Propyne b) 2-butyne c) 1,3-butadiene d) Pentene

216. The conversion



Can be effected using
a) Br_2/CCl_4 b) Br_2/H_2O
c) Br_2/Fe d) Br/ benzoyl peroxide

217. Which of the following cycloalkane gives open chain compound, when reacts with bromine?
a) Cyclopropane b) Cyclopentane c) Cyclohexane d) Cyclooctane

218. The addition of HBr to an alkene in the presence of peroxide is the example of
a) Electrophilic addition reaction
b) nucleophilic addition reaction
c) Free radical addition reaction
d) The formation of carbocation as an intermediate

219. On mixing a certain alkane with chlorine and irradiating it with UV light, it form one monochloro alkane. The alkane could be
a) Neopentane b) Propane c) Pentane d) Isopentane

220. Which of the following statements is true for ethane, ethene and acetylene?
a) Acetylene is the weakest acid and has the longest C − H bond distance
b) Acetylene is the strongest acid and has the shortest C − H bond distance
c) Ethane is the strongest acid and has the longest C − H bond distance
d) Ethene is the strongest acid and has the shortest C − H bond distance

221. On cracking petrol we get:
a) CH_4
b) C_3H_6
c) Both of the above
d) $CH_3 + CH_4 + C_2H_6$ + alcohols

222. Methyl bromide is converted into ethane by heating it in ether medium with
a) Al b) Zn c) Na d) Cu

223. The addition of oxygen gas to reaction mixture of chlorine and methane (photochemical chlorination):
a) Accelerates the reaction
b) Retards the reaction for sometime

c) Has no effect on the rate of reaction

d) May accelerate or retard the reaction depending upon the amount of oxygen

224. Order of reactivity of C_2H_6, C_2H_4 and C_2H_2 is

a) $C_2H_6 > C_2H_4 > C_2H_2$ b) $C_2H_2 > C_2H_6 > C_2H_4$

c) $C_2H_4 > C_2H_2 > C_2H_6$ d) All are equally reactive

225. Bacterial decomposition of cellulose material present in sewage water gives:

a) H_2 b) CH_4 c) O_2 d) N_2

226. The reaction, $CH_3Br + Na \rightarrow$Product, is called

a) Perkin reaction b) Levit reaction c) Wurtz reaction d) Aldol condensation

227. *Meso*-dibromobutane on debromination gives

a) *trans*-2-butene b) *cis*-2-butene c) 1-butene d) 1-butyne

228. $CH \equiv CH + HBr \rightarrow X$, product X is

a) Ethylene bromide b) Vinyl bromide

c) Bromo ethane d) Ethyledine bromide

229. Kolbe's synthesis of sodium salt of butanoic acid gives:

a) n-hexane b) Isobutane c) Butane-1 d) Ethylene

230. The compound formed when silver powder is heated with chloroform:

a) CH_4 b) C_2H_2 c) C_2H_4 d) C_2H_6

231. The reaction of toluene with chlorine in the presence of ferric chloride gives predominantly

a) m-chlorotoluene b) Benzyl chloride

c) Benzoyl chloride d) o and p-chlorotoluene

232. Which of the following will yield *trans* product from butyne?

a) $LiAlH_4$ b) $Na/Liq.\ NH_3$ c) $NaBH_4$ d) Ni catalyst

233. A hydrocarbon of molecular formula C_6H_{10} reacts with sodamide and the same on ozonolysis followed by hydrogen peroxide oxidation gives two molecules of carboxylic acids, one being optically active. Then, the hydrocarbon may be

a) 1-hexyne b) 3-hexyne

c) 3-methyl-1-pentyne d) 3,3-dimethyl-1-butyne

234. Which of the following is not correct about the reaction,

$CH_2 = CH_2 + Br_2 \xrightarrow{NaI(aq)} ?$

a) The products formed are CH_2BrCH_2Br and CH_2BrCH_2I

b) The reaction follows polar mechanism

c) The reaction occurs readily in solution and is catalysed by inorganic halides

d) CH_2ICH_2I is formed only

235. During ozonolysis of $CH_2 = CH_2$ if hydrolysis is made in absence of Zn dust the products formed are:

a) HCHO b) HCOOH c) CH_3OH d) CH_2OHCH_2OH

236. The formation of butane on heating C_2H_5I with Na in presence of ether is contaminated with impurities of:

a) C_2H_4 b) C_3H_6 c) CH_4 d) None of these

237. When sodium propionate is heated with soda-lime, the product formed is

a) Methane b) Ethane c) Ethene d) Ethyne

238. Isopropyl bromide on Wurtz reaction gives

a) Hexane b) Propane

c) 2,3-dimethyl butane d) *neo*-hexane

239. Which one of the following has the minimum boiling point?

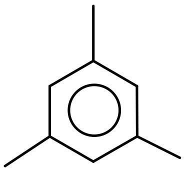
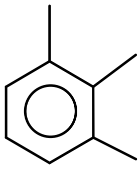
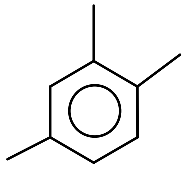
a) n-butane b) 1-butyne c) 1-butene d) *Iso*-butene

240. The substance that would not at all be formed during the reaction of methane and chlorine in the presence of sunlight is:

a) CH_3Cl b) $CHCl_3$ c) CH_3CH_3 d) $CH_3CH_2CH_3$

241. When isopropyl magnesium iodide is treated with water, the product is:
a) Propane b) n-butane c) Isobutene d) Isobutyl alcohol

242. The monosodium salt of acetylene on treating with dry CO_2 forms:
a) $CH \equiv CCOOH$ b) $CH \equiv CCOONa$ c) $CH \equiv CCONa$ d) None of these

243. Propyne on passing through red hot iron tube gives
a)  b)  c)  d) None of these

244. $(CH_3)_3CMgCl$ on reaction with D_2O produces
a) $(CH_3)_3COD$ b) $(CD_3)_3CH$ c) $(CH_3)_3CD$ d) $(CD_3)_3CD$

245. n-hexadecane (cetane) has cetane number:
a) 100 b) Zero c) 90 d) 110

246. Acetylene does not react with
a) Na b) ammoniacal $AgNO_3$ c) HCl d) NaOH

247. What volume of CH_4 at NTP is formed when 20.5 g of CH_3COONa is treated with sodalime?
a) 4.4 litre b) 2.2 litre c) 3.2 litre d) 5.6 litre

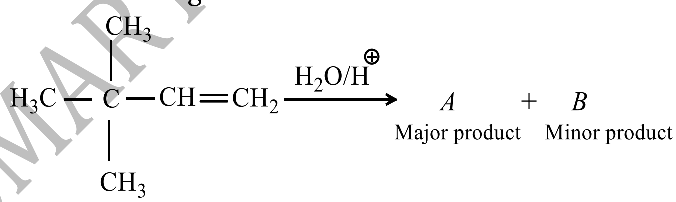
248. The hydrocarbon which decolourizes alkaline $KMnO_4$ solution, but does not give any precipitate with ammoniacal silver nitrate is:
a) Benzene b) Acetylene c) Propyne d) Butyne-2

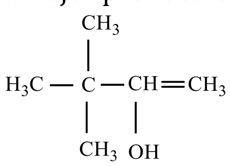
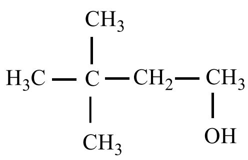
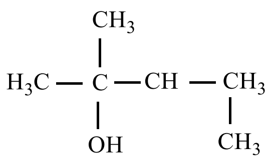
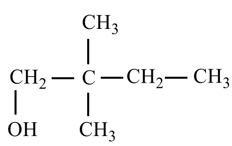
249. What is the molecular formula of the product formed when benzene is reacted with ethyl chloride in presence of anhydrous aluminium chloride?
a) C_8H_{10} b) C_6H_6 c) C_8H_8 d) C_6H_5Cl

250. Which will give $CH_2 = C = CH_2$?
a) $CH_2Br\text{—}CBr = CH_2 \xrightarrow{Zn/CH_3OH}$
b) $CH \equiv C\text{—}CH_2\text{—}COOH \xrightarrow{K_2CO_3(aq)}$
c) $2CH_2 = CH\text{—}CH_2I \xrightarrow{2Na}$
d) None of the above

251. A dibromo derivative of an alkane reacts with sodium metal to form an alicyclic hydrocarbon. The derivative is
a) 1,1-dibromopropane b) 2,2-dibromopropane
c) 1,2-dibromoethane d) 1,4-dibromobutane

252. By coaltar distillation which is not obtained?
a) Light oil b) Middle oil c) Heavy oil d) Mobil oil

253. In the following reaction:


The major product is:
a)  b)  c)  d) 

254. The treatment of ethane with cold alkaline potassium permanganate produces
a) Ethylene glycol b) Formaldehyde
c) Formic acid d) Carbon dioxide and water

255. As compared to melting points of even carbon chain isomers, the melting points of odd carbon chain alkanes are:

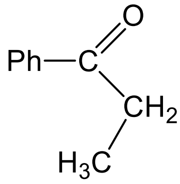
a) Lower

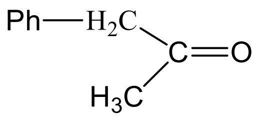
b) Higher

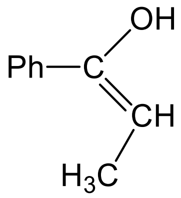
c) Same

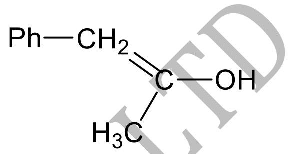
d) Not depend upon branching

256. $Ph - C \equiv C - CH_3 \xrightarrow{Hg^{2+}/H^+} A$,

a) 

b) 

c) 

d) 

257. In the reactions,

$$B \xleftarrow{\text{Lindlar catalyst}/H_2} RC \equiv CR \xrightarrow[H_2]{Na/NH_3} A$$

A and B are geometrical isomers. Then,

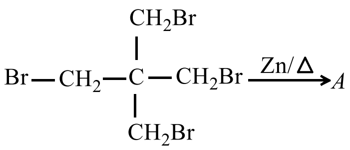
a) A is *cis* and B is *trans*

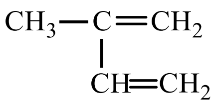
b) A is *trans* and B is *cis*

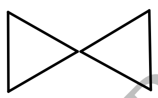
c) A and B are *cis*

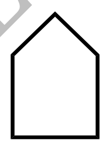
d) A and B are *trans*

258. Identify 'A' in the reaction:



a) 

b) 

c) 

d) $CH_3C \equiv CH = CH_2$

259. Choose the correct statement

a) Acetylene is more reactive than ethylene to an electrophilic attack

b) Acetylene and ethylene show similar reactivities towards an electrophilic attack with different rates

c) The reactivities of acetylene and ethylene towards an electrophilic attack depend on the electrophilic reagent

d) Acetylene is less reactive than ethylene to an electrophilic attack

260. $C_6H_5CH_3 \xrightarrow{CrO_2Cl_2} Z$

In the given sequence, Z is

a) Benzaldehyde

b) Toluic acid

c) Phenyl acetic acid

d) Benzoic acid

261. 2-hexyne can be converted to *trans*-2-hexene by the action of:

a) $H_2 - Pd/BaSO_4$

b) $Li/Liq.\ NH_3$

c) $H_2 - Pt\,O_2$

d) $NaBH_4$

262. In the following reaction,

$RCH_2CH = CH_2 + ICI \rightarrow [A]$

Markownikoff's product $[A]$ is

a) $RCH_2CH(Cl) - CH_2I$

b) $RCH_2CH(I) - CH_2CI$

c) $RCH_2 - C(I) = CH_2$

d) $RCH = CH - CH_2I$

263. Which of the following will not produce ethane?

a) Reduction of CH_3COOH with HI and red P
b) Reduction of CH_3COCH_3 with HI and red P
c) Sodalime decarboxylation of sodium probionate
d) Hydrogenation of ethane in presence of Raney-Ni

264. Which will not react with acetylene?
a) NaOH b) Na c) HCl d) Amm. $AgNO_3$

265. Ozonolysis of an organic compounds gives formaldehyde as one of the products. This confirms the presence of
a) Two ethylenic double bonds b) A vinyl group
c) An *iso*-propyl group d) An acetylenic triple bond

266. Among the paraffins it is generally found that with an increase in the molecular weight:
a) The freezing point decreases
b) The boiling point decreases
c) The boiling point increases
d) The vapour density decreases

267. Which of the following reactions can be used to prepare methane?
a) Clemmensen reduction
b) Wurtz reaction
c) Reduction of $CH_2=CH_2$ by $LiAlH_4$
d) Reduction of methyl iodine by using a zinc-copper couple

268. Ethylene reacts with dil. H_2SO_4 in presence of $HgSO_4$ to give:
a) Ethanal b) Ethanol c) Ethane d) Ethene

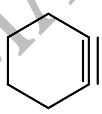
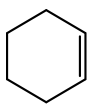
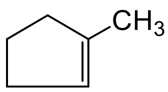
269. Household gas or liquefied petroleum gas (L.P.G.) mainly contains:
a) Methane and ethane
b) Liquefied butane and isobutene
c) Ethylene and CO
d) C_2H_2 and H_2

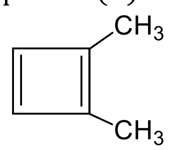
270. Which one of the following gives, on ozonolysis, both aldehydes and ketones?
a) $Me_2C=CHMe$ b) $Me_2C=CMe_2$
c) $MeCH_2-C(Me)=CMe_2$ d) $MeCH(Me)-CH=CHMe$

271. Which among the following give alkanes on reduction?
a) Aldehydes b) Ketones c) Carboxylic acids d) All are correct

272. Lewisite (a war gas) is an…….compound.
a) Organosulphur b) Organoarsenic c) Organoantimony d) Organophosphorus

273. In the following reaction,
$C_2H_2 \xrightarrow[HgSo_4/H_2SO_4]{H_2O} X \rightleftharpoons CH_3CHO$. What is X?
a) CH_3CH_2OH b) CH_3-O-CH_3 c) CH_3CH_2CHO d) $CH_2=CHOH$

274. Compound (A) on oxidation with $OsO_4/NaIO_4$ gives Hexanedinal. Structure of compound. (A) will be
a) 
b) 
c) 

d) 

275. Major product of the following reaction is:
$CH_3-\underset{H}{\overset{Br}{C}}-CH_2-CH_3 + \text{Alc.KOH} \longrightarrow ?$
a) Butene-1 b) Butene-2 c) Butane d) Butyne-1

276. The compound formed as a result of oxidation of ethyl benzene by $KMnO_4$ is

a) Benzophenone b) Acetophenone c) Benzoic acid d) Benzyl alcohol

277. Methane reacts with conc. HNO_3 at high temperature to yield:
a) CO_2 and H_2O b) HCHO c) HCOOH d) CH_3NO_2

278. Butyne-1 and butyne-2 can be distinguished by:
a) Br_2, CCl_4
b) H_2, Lindler catalyst
c) Dilute H_2SO_4, $HgSO_4$
d) Ammoniacal cuprous chloride

279. An isolated alkadiene is:
a) Penta-1,4-diene b) Penta-1,3-diene c) Penta-1,2-diene d) None of these

280. $CH_3 - C \equiv C - CH_3 \xrightarrow{\text{Lindlar's catalyst}} A$, the compound A is
a) *cis*-2-butene b) *trans*-2-butene c) *iso*-butene d) 1-butene

281. If a halogen compound contains OH group, will it be possible to carry out the Wurtz reaction?
a) Yes b) No c) - d) -

282. Reduction of 2-butyne with Na in liquid NH_3 gives predominantly:
a) n-butane b) *Trans*-2-butene c) No reaction d) *Cis*-2-butene

283. Phenyl magnesium bromide reacts with methanol to give
a) A mixture of anisol and Mg(OH)Br
b) A mixture of benzene and Mg(OMe)Br
c) A mixture of toluene and Mg(OH)Br
d) A mixture of phenol and Mg(Me)Br

284. Iso-octane is added to petrol:
a) To precipitate inorganic material
b) To prevent freezing of petrol
c) To increase the boiling point of petrol
d) To increase octane number

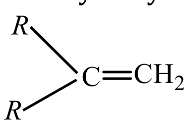
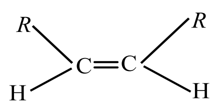
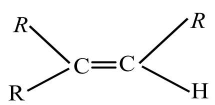
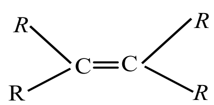
285. When cyclohexane is poured on water, it floats, because:
a) Cyclohexane is in 'boat' form
b) Cyclohexane is in 'chair' form
c) Cyclohexane is in 'crown' form
d) Cyclohexane is less dense than water

286. Ethylene reacts with 1% cold alkaline $KMnO_4$ (Baeyer's reagent) to form:
a) Oxalic acid b) Acetic acid c) Glycerol d) Glycol

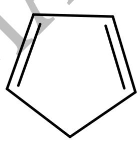
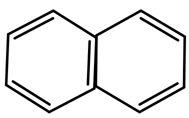
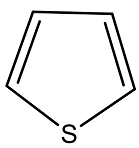
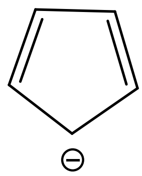
287. The reagent that would effect the following transformation is:
$C_6H_5 - CH = CH - NO_2 \rightarrow C_6H_5CH_2 - CH_2 - NO_2$:
a) $NaBH_4$in alcohol b) $[(C_6H_5)_3P]_3RhCl/H_2$ c) $LiAlH_4$ d) All of these

288. How many primary and tertiary carbon atoms are present in
$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_3$?
a) $3p, 1t$ b) $2p, 2t$ c) $1p, 3t$ d) None of these

289. Which of these will not react with acetylene?
a) NaOH b) Amm. $AgNO_3$ c) Na d) HCl

290. The catalytic hydrogenation is more easier in case of which alkene?
a) 
b) 
c) 
d) 

291. Addition of hydrogen on C=C is called hydrogenation. Addition of halogen on C=C is called:
a) Halogenation
b) Dehalogenation
c) Elimination of halogen
d) None of these

292. The synthetic gas is:
a) CH_4 b) C_2H_2 c) $CO + 3H_2$ d) NH_3
293. Toluene on treatment with CrO_3 and $(CH_3CO)_2O$ followed by hydrolysis with dil. HCl gives
a) Benzaldehyde b) Benzoic acid c) Phenol d) Phenylacetaldehyde
294. Identify the product (P) in the reaction:
$R_3C—H \xrightarrow{\text{Alk.KMnO}_4} P$
a) No reaction b) $R_3C—CR_3$ c) $R_3C—OH$ d) $R_3C—O—CR_3$
295. *Gem* dihalides on treatment with alcoholic KOH give
a) Alkyne b) Alkene c) Alkane d) All of these
296. The presence of Ag^+ ion increases the solubility of alkenes due to the formation of
a) $d\pi - d\sigma$ bonding b) $p\sigma - p\pi$ bonding c) $p\pi - d\pi$ bonding d) $p\pi - d\sigma$ bonding
297. Acetylene and HCHO react in 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
298. Decarboxylation of isobutyric acid leads to:
a) Isobutene b) Propane c) Butane d) None of these
299. In the addition of HBr to propene in the absence of peroxides the first step involves the addition of:
a) H^+ b) Br^- c) H° d) Br
300. The IUPAC name of— $C \equiv C—CH_3$ group is:
a) Prop-2-ynyl b) Prop-2-enyl c) Prop-1-ynyl d) None of these
301. Pure methane can be produced by
a) Wurtz reaction b) Kolbe's electrolytic method
c) Soda lime decarboxylation d) reduction with H_2
302. What are X and Y respectively, in the following reaction?
$Z - \text{product} \xleftarrow{Y} 2 - \text{butyne} \xrightarrow{X} E - \text{product}$
a) $Na/NH_3(\text{liq.})$ and $Pd/BaSO_4 + H_2$ b) $Ni/140°C$ and $Pd/BaSO_4 + H_2$
c) $Ni/140°C$ and $Na/NH_3(\text{liq.})$ d) $Pd/BaSO_4 + H_2$ and $Na/NH_3(\text{liq.})$
303. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is
a) Methanoic acid b) Ethanal c) Methanol d) Methanal
304. 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
305. Conformation in molecules is due to:
a) Rotation about a single bond
b) Change in direction of light
c) Structural changes
d) Restricted rotation about a double bond
306. The non-aromatic compound among the following is
a)  b)  c)  d) 
307. Kerosene is a mixture of:
a) Alkenes b) Alkanes c) Alkynes d) Arenes
308. Which of the following alkenes is most stable?
a) $R_2C = CR_2$ b) $R—CH = CH—R$ c) $RCH = CH_2$ d) $CH_2 = CH_2$
309. What is obtained when chlorine is passed in boiling toluene and product is hydrolysed?
a) o-cresol b) p-cresol

c) 2,4-dihydroxytoluene
d) Benzyl alcohol

310. It is necessary to use…..in the iodination of alkane.
a) Alcohol
b) Oxidant
c) Benzene
d) Reductant

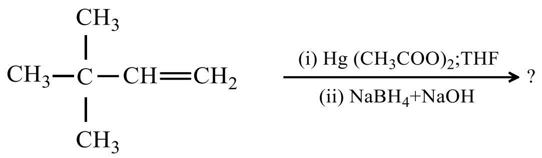
311. Ozonolysis of propyne gives:
a) CH_3CHO
b) CH_3COCHO
c) HCHO
d) CHOCHO-

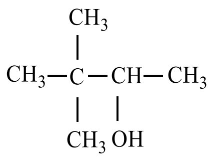
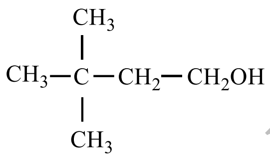
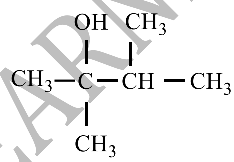
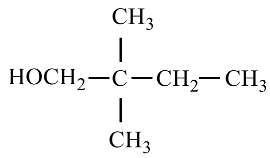
312. Reactivity of alkenes towards HX decreases in the order:
a) Butene>propene>ethene
b) Butene>ethene>propene
c) Ethene>propene>butene
d) None of the above

313. Propyne on oxidation with SeO_2 gives:
a) CHOCHO
b) CH_3CH_2CHO
c) CH_3COCHO
d) $CHOCH_2CHO$

314. 2-methylbutane on reacting with bromine in the presence of sunlight gives mainly
a) 1-bromo 3-methylbutane
b) 2-bromo 3-methylbutane
c) 2-bromo 2-methylbutane
d) 1-bromo 2-methylbutane

315. The product of following reaction is,



a) 
b) 
c) 
d) 

316. Which statement is correct?
a) Alkanes are called paraffins because of their little chemical affinity
b) Alkanes have only sigma bonds
c) Most abundant alkane is CH_4
d) All are correct

317. An activating group
a) actinates 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*

318. An alkyl bromide,RBrof molecular weight 151 is the exclusive product of bromination of which hydrocarbon?
a) Dodecane
b) 2, 2-dimethylpropane
c) 2, 2-dimethylhexane
d) 2, 2, 3-trimethylheptane

319. The conversion of liquid hydrocarbon into a mixture of gaseous compounds by heat alone is known as:
a) Hydrolysis
b) Reduction
c) Oxidation
d) Cracking

320. Ethyl benzene cannot be prepared by
a) Wurtz reaction
b) Wurtz-Fittig reaction
c) Friedel-Craft’s reaction
d) Clemmensen reduction

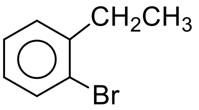
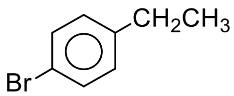
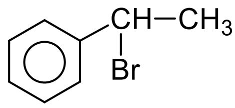
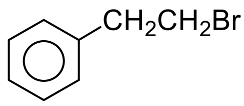
321. Silver acetylide when heated with HCl gives:
a) C_2H_2
b) H_2
c) C_2H_4
d) C_6H_6

322. 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) $Cl_2CHCH(Cl)CH_2Cl$

323. Sodium ethoxide is specific reagent for:
a) Dehydration
b) Dehydrohalogenation
c) Dehydrogenation
d) Dehalogenation

324. A fuel contains 25% n-heptane and 75% iso-octane. Its octane number is:
a) 50 b) 75 c) 100 d) 25

325. The greatest strain is involved in cycloalkane, when the bond angle is:
a) 60° b) 90° c) 120° d) 108°

326. Which of the following will be obtained by the bromination of ethylbenzene in the presence of light?
a) 
b) 
c) 
d) 

327. On passing electric discharge through graphite in presence of H_2 the compound formed is:
a) CH_4 b) C_2H_6 c) C_2H_2 d) All of these

328. Propene reacts with Cl_2 at 400-600°C to give:
a) 1,2-dichloropropane b) Allyl chloride c) No reaction d) Polyvinyl chloride

329. Methane reacts with oxygen at 100 atm and 300°C in presence of Cu to give:
a) Acetaldehyde b) Methyl alcohol c) Acetic acid d) Ethyl alcohol

330. Ethylene is used in making:
a) Anti-freeze b) Solvent c) Fumigant d) All of these

331. The main constituent of light oil fraction is:
a) Benzene b) Toluene c) Phenol d) Naphthalene

332. The major product in the acid catalysed dehydration of 2-pentanol is:
a) 4-pentene b) 3-pentene c) 2-pentene d) 1-pentene

333. Which gas is commonly used in welding?
a) C_2H_4 b) C_2H_2 c) CH_4 d) C_2H_6

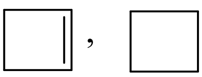
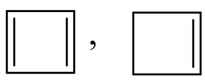
334. The synthesis of 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and an alkyne. The bromoalkane and alkyne respectively are
a) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$
b) $BrCH_2CH_2CH_3$ and $CH_3CH_2CH_2C \equiv CH$
c) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3C \equiv CH$
d) $BrCH_2CH_2CH_2CH_3$ and $CH_3CH_2C \equiv CH$

335. Which is most acidic of the following?
a) Methane b) Acetylene c) 1-butene d) Neo-pentane

336. Addition of HI on double bond of propene yields isopropyl iodide and not n-propyl iodide as the major product, because addition proceeds through:
a) A more stable carbonium ion
b) A more stable carbanion
c) A more stable free radical
d) None of the above

337. Correct statement about 1,3-dibutene
a) Conjugated double bonds are present
b) Reacts with HBr
c) Forms polymer
d) All of the above

338. Preparation of ethane by electrolysis of aqueous solution of potassium acetate is called
a) Wurtz reaction
b) Kolbe's synthesis
c) Grignard reaction
d) Sabatier-Sendersen's reaction

339. $A(C_4H_6) \xrightarrow[\text{1 mole}]{H_2,Ni} B(C_4H_8) \xrightarrow{O_3/H_2O/Zn} CH_3CHO$
Thus, A and B are
a) 
b) 
c) $CH_3CH_2C \equiv CH, CH_3CH = CHCH_3$
d) $CH_2 = CH - CH = CH_2, CH_3CH = CH - CH_3$

340. The major product P in the following reaction is
$$CH_3 - CH = CH_2 \xrightarrow[\text{peroxide}]{HI} P$$

a) $CH_3CH_2CH_2I$

b) $CH_3-\underset{\underset{I}{|}}{CH}-CH_3$

c) $\underset{\underset{I}{|}}{CH_2}-CH=CH_2$

d) $\underset{\underset{I}{|}}{CH_2}-\underset{\underset{I}{|}}{CH_2}$

341. $CH_3CH=CHCHO$ is oxidized to $CH_3CH=CHCOOH$ using:
a) Alkaline permanganate
b) Ammoniacal silver nitrate
c) Selenium dioxide
d) Osmium tetraoxide

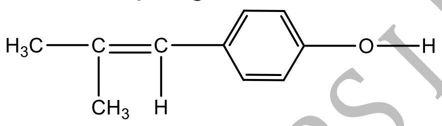
342.
$CaC_2+H_2O\rightarrow X\xrightarrow{O_3/\frac{H_2O}{OH^+}} HCOOH$
$+HCOOH, X$ is
a) C_2H_4 b) C_2H_2 c) C_2H_6 d) $Ca(OH)_2$

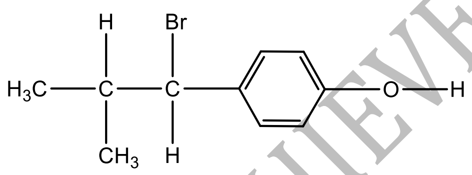
343. Acetylene reacts with hypochlorous acid to form
a) $Cl_2CH.CHO$ b) $ClCH_2COOH$ c) CH_3COCl d) $ClCH_2CHO$

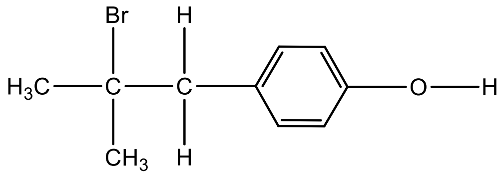
344. Dehydrohalogenation of 1,2-dibromobutane with alc. KOH gives:
a) 1-butyne b) 2-butene c) 1-butene d) 1-bromo-1-butene

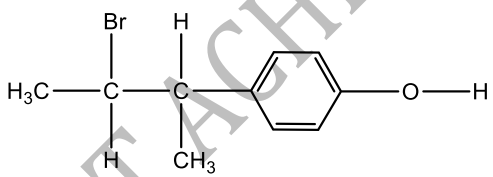
345. Water can be added across a triple bond in the presence of
a) Acidic medium b) Alkaline medium c) Neutral medium d) Acid and $HgSO_4$

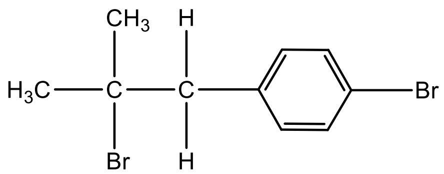
346. Both methane and ethane may be obtained in one step reaction from:
a) CH_3COONa b) CH_3I c) Both (a) and (b) d) None of these

347.

The reaction of
with HBr gives predominantly

a) 

b) 

c) 

d) 

348. The product formed when acetylene is passed through red hot tube is:
a) Benzene b) Cyclohexane c) Neoprene d) Ethane

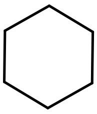
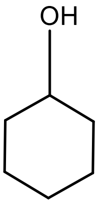
349. The product formed when toluene is heated in light with Cl_2 and in absence of halogen carrier is
a) Chlorobenzene b) Gammexane c) Benzotrichloride d) DDT

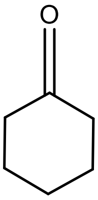
350. Among the following statement on the nitration of aromatic compounds, the false one is
a) The rate of nitration of benzene is almost the same as that of hexadeuterobenzene
b) The rate of nitration of toluene is greater than that of benzene
c) The rate of nitration of benzene is greater than that of hexadeuterbenzene
d) Nitration is an electrophilic substitution reaction

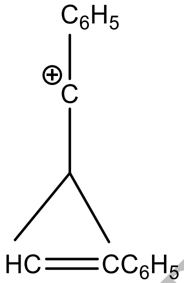
351. Reaction of one molecule of HBr with one molecule of 1, 3-butadiene at 40°C gives predominantly
a) 1-bromo-2-butene under kinetically controlled conditions
b) 3-bromobutene under thermodynamically controlled conditions
c) 1-bromo-2-butene under thermodynamically controlled conditions

d) 3-bromobutene under kinetically controlled conditions

352. Which of the following compound is aromatic?

a) 
b) 

c) 

d) 

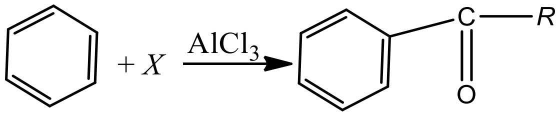
353. Ethylene reacts with 1% alkaline $KMnO_4$ to form

a) Oxalic acid b) Ethylene glycol c) Ethyl alcohol d) HCHO

354. To prepare a pure sample of n-hexane using sodium metal as one reactant, the other reactant or reactants will be:

a) Ethyl chloride and n-butyl chloride
b) Methyl bromide and n-pentyl bromide
c) n-propyl bromide
d) Ethyl bromide and n-butyl bromide

355. Friedel-Craft acylation can be given by



X is

a) $R-\underset{\underset{O}{||}}{C}-Cl$ b) $R-\underset{\underset{O}{||}}{C}-R$ c) $R-\underset{\underset{O}{||}}{C}-H$ d) $R-O-R$

356. A mixture of CS_2 and H_2S on passing over heated Cu gives:

a) C_2H_6 b) CH_4 c) C_3H_8 d) None of these

357. Photochemical chlorination of alkane is initiated by a process of:

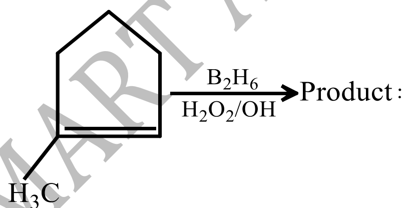
a) Pyrolysis b) Substitution c) Homolysis d) Peroxidation

358. Under which one of the following conditions, does the reaction,

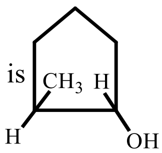
$CH \equiv CH + CH_3OH \xrightarrow{?} CH_3O-CH=CH_2$ take place?

a) $NH_4OH/80°C$ b) Conc. $H_2SO_4/160°C$
c) Anhydrous $ZnCl_2/150°C$ d) $CH_3OK/160-200°C$

359. Which one is correct for the given change?



a) The product formed is *trans*-2-methyl-1-cyclopentanol

b) The product formed is 

c) The addition is syn addition
d) All of the above

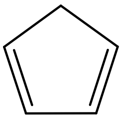
360. The electrolysis of aqueous solution of potassium succinate produces

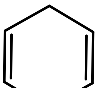
a) Methyl alcohol b) ethyl alcohol c) ethene d) ethane

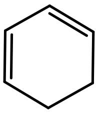
361. Ozonolysis products of an olefin are

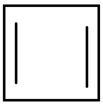
CHO CH_2CHO
| and |
CHO CH_2 CHO

Olefin is

a) 

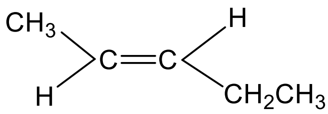
b) 

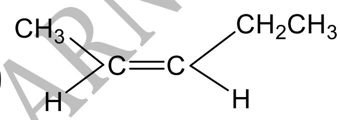
c) 

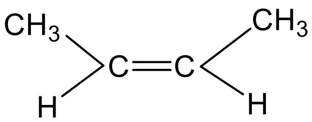
d) 

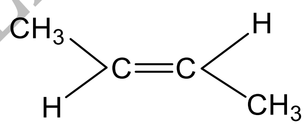
362. $CH_3C \equiv CH \xrightarrow[\text{(2) } CH_3CH_2Br]{\text{(1)} NaNH_2} A \xrightarrow[\text{Lindlar's catalyst}]{H_2} B$

What is B in the above reaction?

a) 

b) 

c) 

d) 

363. The gas believed to be the cause of explosion in coal-mines or fire damp is:
a) Methane b) Ethane c) C_3H_8 d) CO

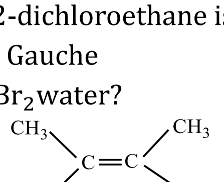
364. Addition of HBr to propylene in presence of benzoyl peroxide, follows
a) Markownioff's rule b) Baeyer's rule
c) Carbanion mechanism d) *anti*-Markownioff's rule

365. 2-phenyl propene on acidic hydration gives,
a) 2-phenyl-2-propanol b) 2-phenyl-1-propanol
c) 3-phenyl-1-propanol d) 1-phenyl-2-propanol

366. $CH_2 = CH_2$ is also called a:
a) Monomer b) Polymer c) Isomer d) Equimer

367. Halogenation of alkanes is an example of:
a) Electrophilic substitution
b) Nucleophilic substitution
c) Free radical substitution
d) Oxidation

368. The most stable isomer of 1,2-dichloroethane is:
a) Staggered b) Gauche c) Eclipsed d) Partially eclipsed

369. Which does not decolourize Br_2water?
a) $CH_2 = CH_2$ b) 

c) $CH_3C \equiv CH$ d) $CH_2 = CHCH_3$

370. Grignard's reagent gives alkane with:

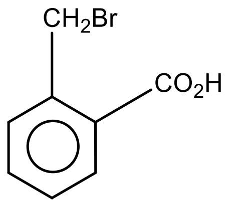
a) H_2O b) C_2H_5OH c) $C_2H_5NH_2$ d) All of these

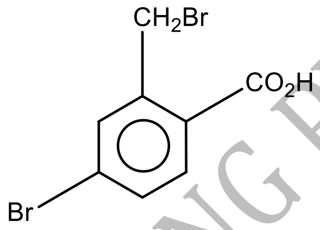
371. The carbon-carbon bond length in benzene is
a) In between C_2H_6 and C_2H_4
b) Same as in C_2H_4
c) In between C_2H_6 and C_2H_2
d) In between C_2H_4 and C_2H_2

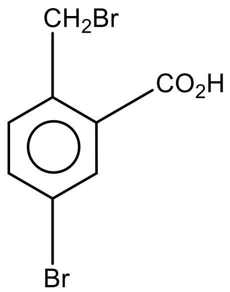
372. Electrolysis of a concentrated solution of sodium fumarate gives:
a) Fumaric acid b) Ethylene c) Ethane d) Acetylene

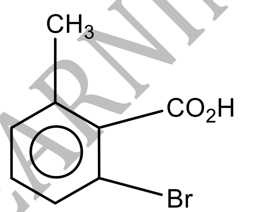
373. In order to overcome angle strain, cyclohexane acquires:
a) Square planar structure
b) Planar structure
c) Puckered ring structure
d) Pyramidal structure

374. *o*-toluic acid on reaction with $Br_2 + Fe$ gives

a) 

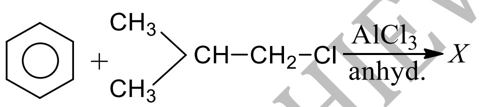
b) 

c) 

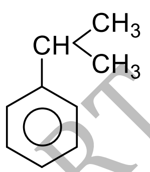
d) 

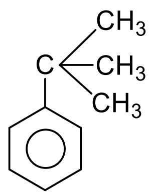
375. The reaction, $CH_2{=}CH_2 + H_2 \xrightarrow[250\text{-}300^\circ C]{Ni} CH_3\text{-}CH_3$

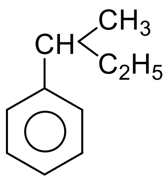
is called:
a) Wurtz's reaction b) Kolbe's reaction c) Sabatier and Senderens reaction d) Carbylamines reaction

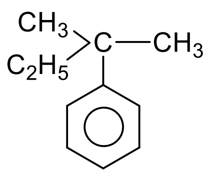
376. 

Identify the X in the above reaction

a) 

b) 

c) 

d) 

377. $CH_3 - CH = CH_2 + NOCl \rightarrow P$
Identify the adduct

a) $\begin{array}{ccccc} CH_3 & - & CH & - & CH_2 \\ & & | & & | \\ & & Cl & & NO \end{array}$

b) $\begin{array}{ccccc} CH_3 & - & CH & - & CH_2 \\ & & | & & | \\ & & NO & & Cl \end{array}$

c) $\begin{array}{ccccc} CH_3 & - & CH_2 & - & CH \\ & & & & | \\ & & & & Cl \end{array}$

d) $\begin{array}{ccccc} CH_2 & - & CH_2 & - & CH_2 \\ | & & & & | \\ NO & & & & Cl \end{array}$

378. Ethane can be freed(isolated) from the impurity of ethylene by washing with:
a) HCl b) HNO_3 c) H_2SO_4 d) water

379. Poisonous gases are:
a) Phosgene b) Lewisite c) Mustard gas d) All of these

380. A chlorohydrocarbon, named chlorodane is used especially as:
a) Insecticide b) Anti-worm c) Fungicide d) Anti-termite

381. The highest boiling point is expected for
a) *iso*-octane
b) n-octane
c) 2, 2, 3, 3-tetramethyl butane
d) n-butane

382. The addition of tetraethyl lead of petrol:
a) Lowers its octane number
b) Raises its octane number
c) May raise or lower the octane number
d) Has no effect on octane number

383. Which of the following reactions will give an alkyne?
a) $CH_3CBr_2CHBr_2 \xrightarrow{\text{Zn/alc.}}$
b) $CH_3CH_2CHBr_2 \xrightarrow{\text{alc.KOH}}$
c) $CH_3CHBrCH_2Br \xrightarrow{NaNH_2}$
d) All of the above

384. Which one among the following is assigned an octane number of zero?
a) Iso-octane b) n-heptane c) Isoheptane d) 2-methyloctane

385. The process where straight run gasoline is cracked in order to increase octane number is called:
a) Aromatization b) Rearrangement c) Substitution d) Reforming

386. The treatment of aluminum carbide with water or dilute acid produces
a) acetylene b) ethene c) methane d) ethane

387. When acetylene is passed through red hot iron tube, compound X is formed. Which one of the following reactions will yield X as the major product?
a) $C_6H_5OH + Zn \xrightarrow{\text{Distillation}}$
b) $C_6H_5SO_3H + NaHCO_3 \rightarrow$
c) $C_6H_{12} + 3H_2 \xrightarrow{\text{Ni}}$
d) $C_6H_5Cl + H_2O \xrightarrow{\Delta}$

388. In the reaction
$C_6H_5CH_3 \xrightarrow{\text{Oxidation}} A \xrightarrow{\text{NaOH}} B \xrightarrow{\text{Sodalime}} C$
Identify C is
a) C_6H_5OH b) C_6H_6 c) C_6H_5COONa d) C_6H_5ONa

389. The major product formed when a 3, 3-dimethyl butan-2-ol is heated with concentrated sulphuric acid, is
a) 2,3-dimethyl-2-butene
b) 2,3-dimethyl-1-butene
c) 3,3-dimethyl-1-butene
d) *cis* and *trans* isomers of 2,3-dimethyl-1-butene

390. Most of the hydrocarbons from petroleum are obtained by:
a) Fractional distillation
b) Fractional crystallization
c) Vaporisation
d) Polymerization

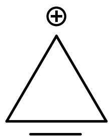
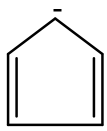
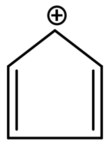
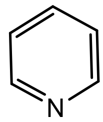
391. Cyclopentadienyl anion is
a) Aromatic b) Non-aromatic c) Non-planar d) Aliphatic

392. Ozonolysis of buta-1,3-diene gives:
a) HCHO and glyoxal
b) CH_3CHO and glyoxal
c) $CO_2$and glyoxal
d) HCHO+glyoxal+CH_3CHO

393. Which is not true in the case of natural gas?

a) It is a fuel
b) It is used in the manufacture of fertilizer
c) It is a mixture of CO_2 and H_2
d) It is a mixture of gaseous hydrocarbons

394. Wurtz reaction using bromoethane yields:
a) 2-bromobutane b) n-butane c) Isobutene d) Ethane

395. Which of the following compounds is not aromatic?
a)  b)  c)  d) 

396. Which products are formed during the addition of Br_2 on ethylene in presence of aqueous $NaNO_3$ solution?
a) $CH_2Br.CH_2ONO_2$
b) $CH_2Br.CH_2Br$
c) $CH_2(ONO_2).CH_2ONO_2$
d) Both (a) and (b)

397. Alkanes containing…..carbon atoms are converted into an aromatic hydrocarbon, when heated in presence of Cr_2O_3 on Al_2O_3
a) 6 to 10 b) 4 to 8 c) 3 to 6 d) 5 to 6

398. Chlorination of toluene in the presence of light and heat followed by treatment with aqueous NaOH solution gives
a) o-cresol b) p-cresol
c) Benzoic acid d) 2,4-dihydroxytoluene

399. Toluene can be converted into benzaldehyde by oxidation with
a) $KMnO_4$/alkali b) CrO_2Cl_2 c) $K_2Cr_2O_7/H_2SO_4$ d) O_2/V_2O_5

400. $CH_3 - CH_2 - C \equiv CH \xrightarrow[H_2SO_4]{HgSO_4} A$
The compound A is
a) $CH_3 - CH_2 - \overset{\overset{O}{||}}{C} - CH_3$
b) $CH_3 - CH_2 - CH_2 - CHO$
c) $CH_3 - CH_2 - CH_2 - COOH$
d) None of the above

401. When acetylene is passed through dil. H_2SO_4 in presence of $HgSO_4$, the compound formed is
a) Ether b) Acetaldehyde c) Acetic acid d) Ketone

402. The reagent used for dehydration is:
a) Conc. H_2SO_4 b) P_2O_5 c) Al_2O_3 d) All of these

403. A hydrocarbon has the formula C_3H_4. To find out whether it contains two double bonds or triple bonds, the following test is performed:
a) Passed through ammoniacal $AgNO_3$
b) Treated with Baeyer's reagent
c) Treated with Fehling's solution
d) Treated with Br_2 water

404. The chemicals and the reaction conditions required for the preparation of ethane are
a) $C_2H_5I, Zn - Cu, C_2H_5OH$
b) CH_3Cl, Na, H_2O
c) $KOOC - CH = CH - COOK$, electrolysis
d) $CH_3CO_2Na, NaOH, CaO, \Delta$

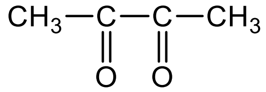
405. Formation of alkane by the action of zinc on alkyl halide is called
a) Wurtz reaction b) Kolbe's reaction c) Ulmann's reaction d) Frankland reaction

406. The two carbon atoms marked by asterisk in
$H_3C - \overset{*}{C} \equiv \overset{*}{C} - CH_3$ possess

the following type of hybridisation:

a) sp^3 b) sp^2 c) sp d) s

407. $CH_3 - C \equiv C - CH_3 \xrightarrow[\text{(ii)Zn/H}_2\text{O}]{\text{(i) } x}$



In the above reaction x is.

a) HNO_3 b) O_2 c) O_3 d) $KMnO_4$

408. Temperature of oxyacetylene flame is:

a) 2549°C b) 2400°C c) 2700°C d) 3000 to 3500°C

409. Benzene can be obtained by heating either benzoic acid with X or phenol with Y. X and Y are respectively

a) Zinc dust and soda lime b) Soda lime and zinc dust

c) Zinc dust and sodium hydroxide d) Soda lime and copper

410. Hydrocarbon reacts with metal by displacing the H-atom is:

a) CH_4 b) C_2H_6 c) C_2H_4 d) C_2H_2

411. Petroleum is a mixture of:

a) Aromatic hydrocarbons with small amounts of aliphatic compounds

b) Aliphatic hydrocarbons with small amounts of aromatic compounds

c) Mixture of equal amount of aliphatic and aromatic hydrocarbons

d) Alcohols and fatty acids

412. The reduction of an alkyne to alkene using Lindlar catalyst result into

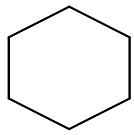
a) *cis* addition of hydrogen atoms

b) *trans* addition of hydrogen atoms

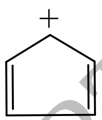
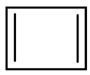
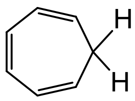
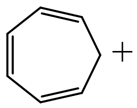
c) A mixture obtained by *cis* and *trans* additions of hydrogen atoms which are in equilibrium with each other

d) A mixture obtained by *cis* and *trans* additions of hydrogen atoms which are not in equilibrium with each other

413. Which molecule will undergo radical formation oxidation reaction most readily?

a) $CH_3CH_2CH_3$ b) $CH_3CH_2CH_2CH_3$ c) $(CH_3)_3CH$ d) 

414. Which of the following is expected to be aromatic?

a)  b)  c)  d) 

415. Aniline is treated with a mixture of sodium nitrite and hypophosphorus acid, the product formed is

a) Aniline diazonium hypophosphate b) Benzene

c) Anilinium hypophosphite d) Aniline diazonium hypophosphite

416. Hexachloroethane is also called

a) DDT b) TNT c) Artificial camphor d) BHC

417. In presence of nickel cyanide, acetylene gives

a) Benzene b) Cyclooctatetraene c) Cyclohexatriene d) Cyclobutadiene

418. Conjugated double bonds are present in:

a) Propylene b) Isobutylene c) Butylene d) 1,3-butadiene

419. Normal alkanes can undergo sulphonation if they contain:

a) 4 carbon atoms

b) 5 carbon atoms
c) At least 6 carbon atoms
d) 3 carbon atoms

420. $CH_3C\equiv C-CH_3 \xrightarrow[\text{(II) } H_2O/Zn]{\text{(I) } X} CH_3-\underset{\underset{O}{\|}}{C}-\underset{\underset{O}{\|}}{C}-CH_3$

In the above reaction, X is
a) HNO_3 b) O_2 c) O_3 d) $KMnO_4$

421. The dehydrohalogenation of neopentyl bromide with alcoholic KOH gives mostly:
a) 2-methyl-1-butene b) 2,2-dimethyl-1-butene c) 2-methyl-2-butene d) 2-butene

422. What is obtained, when ammoniacal $AgNO_3$ reacts with acetylene?
a) Propanone b) Silver acetylide c) Ethylene d) None of these

423. Which of the following liberates methane on treatment with water?
a) Silicon carbide b) Calcium carbide c) Beryllium carbide d) Magnesium carbide

424. Which statement is correct?
a) Chloroacetic acid is less acidic than acetic acid because chlorine atom has-I effect
b) The greater the branching in a paraffin the lower is its b.p.
c) Kjeldahl's method is used for the estimation of chlorine
d) All of the above

425. The most stable conformational isomer of cyclohexane is:
a) Chair form b) Boat form c) Half chair form d) Twisted form

426. In the following reaction sequences,

$Cl-Cl \longrightarrow \dot{C}l+\dot{C}l$ .... (1)

$\dot{C}l-CH_4 \longrightarrow \dot{C}H_3+HCl$ .... (2)

$\dot{C}H_3+\dot{C}l_2 \longrightarrow \dot{C}H_3+Cl+\dot{C}l$ .... (3)

$\dot{C}H_3+\dot{C}H_3 \longrightarrow CH_3\text{-}Cl_3$ .... (4)

the termination step is:
a) Reaction 1 b) Reaction 2 c) Reaction 3 d) Reaction 4

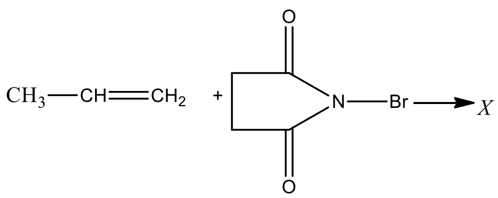
427. Which of the following is elimination reaction?
a) $CH_3CH_2OH \longrightarrow CH_2=CH_2+H_2O$
b) $CH_3CH_2Br \longrightarrow CH_2=CH_2+HBr$
c) $Br-CH_2-CH_2-Br \xrightarrow{Zn} CH_2=CH_2+ZnBr_2$
d) All of the above are correct

428. $CH\equiv CH \xrightarrow{O_3/NaOH} X \xrightarrow{Zn/CH_3COOH} Y$. Y is:
a) CH_2OH-CH_2OH b) CH_3CH_2OH c) CH_3COOH d) CH_3OH

429. Baeyer's reagent is used in the laboratory for:
a) Detection of double bonds b) Detection of glucose c) Reduction d) Oxidation

430. Product formed on electrolysis of potassium salt of fumaric and maleic acid is
a) Ethane b) Ethene c) Ethyne d) Methane

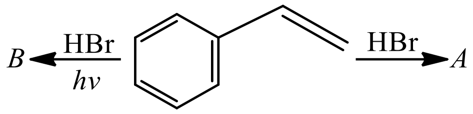
431. The product 'X' in the following reaction is

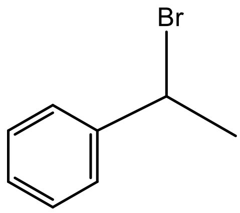


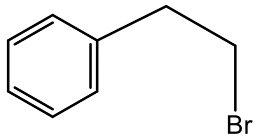
a) $CH_3Br-CH=CH_2$ b) $CH_3-\overset{\overset{Br}{|}}{C}=CH_2$

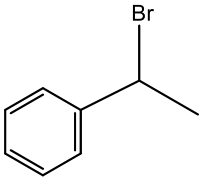
c) $CH_3CH = CHBr$ d) None of the above

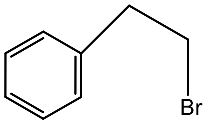
432. Observe the following reactions and predict the nature of *A* and *B*.

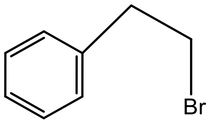


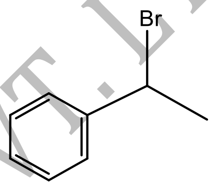
a) *A* and *B* both are 

b) *A* and *B* both are 

c) A *is* 

and *B* is 

d) A *is* 

and *B* is 

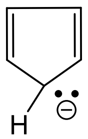
433. HBr is added to $CH_3—CH = CH_2$ in presence of peroxides. The resultant compound is:
a) $CH_3CHBrCH_3$ b) $C_2H_5CH_2Br$ c) $CH_2 = CH_2CH_2Br$ d) None of these

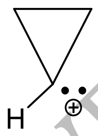
434. Amount of Br_2 required to react with 5 g pentene to form monobromo derivative is:
a) 11.11 g b) 11.43 g c) 5.55 g d) None of these

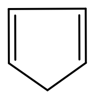
435. The compound (i) decolourises $KMnO_4$ (ii) forms ozonide with ozone and (iii) undergoes polymerization. It will be:
a) C_6H_6 b) C_3H_8 c) C_2H_4 d) C_2H_6

436. The strongest *ortho*/*para* directing group is
a) $-NH_2$ b) $-CH_3$ c) $-Cl$ d) $-C_2H_5$

437. Which of the following species will be aromatic?

a) 

b) 

c) 

d) None of these

438. When chlorine is passed through warm benzene in presence of the sunlight, the product obtained is
a) Benzotrichloride b) Chlorobenzene c) Gammexane d) DDT

439. The C = C bond distance in an organic compound is1.34 Å. It can be
a) Butene b) Hexatriene c) Cyclohexatriene d) Any of these

440. The lowest possible alkane with ethyl group as substituents possesses mol. mass equal to:
a) 16 b) 72 c) 84 d) 128

441. The reagent(s) for the following conversion,
cis/are
a) Alcoholic KOH b) Alcoholic KOH followed by $NaNH_2$
c) Aqueous KOH followed by $NaNH_2$ d) Zn/CH_3OH

442. Aqueous H_2SO_4 reacts with 2-methyl-1-butene to give predominantly:
a) Isopentyl hydrogen sulphate
b) 2-methyl-3-butene
c) 2-methyl-1-butene
d) Secondary butyl hydrogen sulphate

443. The number of conformation(s) for ethane is/are:
a) 1 b) 2 c) 3 d) Infinite

444. The test for unsaturation is confirmed by the decolourisation of which of the following?
a) Iodine water b) $CuSO_4$ solution c) Bromine water d) All of these

445. Which does not react with chlorine in dark?

a) CH_4 b) C_2H_2 c) C_2H_4 d) CH_3CHO

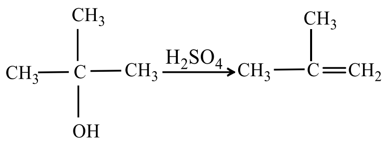
446. The ozonolysis of isobutene gives:

a) CH_3CHO b) CH_3COCH_3 and HCHO c) CH_3CH_2OH d) CH_3OH

447. Which compound on reductive ozonolysis forms only glyoxal?

a) Ethyne b) Ethene c) Ethane d) 1,3-butadiene

448. The reaction,



is the example of:

a) Sulphonation b) Dehydration c) Alkylation d) Decomposition

449. The catalyst used in the manufacture of polythene by Ziegler method is:

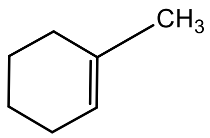
a) Titanium tetrachloride and triphenyl aluminium

b) Titanium tetrachloride and trimethyl aluminium

c) Titanium dioxide

d) Titanium isopropoxide

450.



On reductive ozonolysis yields

a) 6-oxoheptanal b) 6-oxoheptanoic acid

c) 6-hydroxyheptanal d) 3-hydroxypentanal

451. The treatment of CH_3MgX with $CH_3C \equiv C - H$ produces

a) $CH_3 - CH = CH_2$ b) $CH_3C \equiv C - CH_3$ c) $CH_3 - \underset{}{\overset{H}{C}} = \overset{H}{C} - CH_3$ d) CH_4

452. 1,3-butadiene has:

a) Only sp-hybridised C-atoms

b) Only sp^2-hybridised C-atoms

c) sp, sp^2 and sp^3 -hybridised C-atoms

d) Sp and sp^2-hybridised C-atoms

453. Chloroform, on warming with Ag powder gives

a) C_2H_6 b) C_2H_6 c) C_2H_4 d) C_2H_2

454. By Wurtz reaction, a mixture of methyl iodide and ethyl iodide gives

a) Butane b) Ethane

c) Propane d) A mixture of the above three

455. The following reaction is an example of,

$C_3H_8 + 2Cl_2 \xrightarrow{\text{Light}} C_3H_6Cl_2 + 2HCl$

a) An addition reaction

b) A substitution reaction

c) An elimination reaction

d) None of the above

456. Acetylene on passing into excess of HOCI solution forms:

a) Ethylene chlorohydrin

b) Acetaldehyde

c) Dichloroacetaldehyde

d) Methyl chloride

457. Ethylene forms ethylene chlorohydrin by the action of:
a) Dry chlorine gas
b) Dry hydrogen chloride gas
c) Solution of chlorine gas in water
d) Dilute hydrochloric acid

458. Which one of the following has the smallest heat of hydrogenation per mole?
a) 1-butene b) *Trans*-but-2-ene c) *Cis*-but-2-ene d) Buta-1, 3-diene

459.  $\xrightarrow[H_2O_2]{OsO_4} A, A$ is
a) *meso* diol b) Racemic diol c) Both (a) and (b) d) None of these

460. Which of the following characteristic apply both to ethane and ethyne?
a) Explode when mixed with chlorine
b) Decolourise Baeyer's reagent giving brown precipitate
c) Rapidly absorbed by cold conc. H_2SO_4
d) Form white precipitate with $AgNO_3$ solution

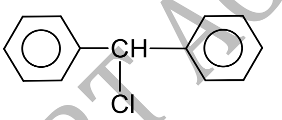
461. Conjugated double bond is present in:
a) Propylene b) Isobutylene c) 1,3-butadiene d) Butylene

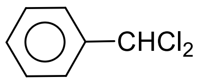
462. The reactivities of ethane, ethylene and acetylene are of the order
a) Ethane<ethene<ethyne b) Ethane <ethyne<ethene
c) Ethyne = ethene> ethane d) Any of the above

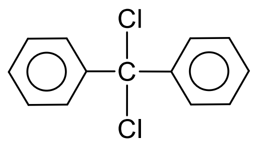
463. Which is not linked with methane?
a) Marsh gas b) Natural gas c) Producer gas d) Coal gas

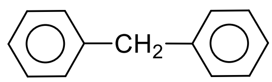
464. Acetylene can be obtained by the reaction?
a) $HCOOK \xrightarrow{\text{Electrolysis}}$
b) $CHI_3 + Ag \xrightarrow{\Delta}$
c) $CH_3CH_2OH \xrightarrow[443\text{ K}]{\text{Conc.}H_2SO_4}$
d) $Be_2C + H_2O \rightarrow$

465. Wet ether is not used as a solvent in Wurtz reaction, because the water present in it
a) Hydrolyses RX to ROH b) Reduces RX to RH
c) Destroy the Na metal d) Reacts with $R - R$

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

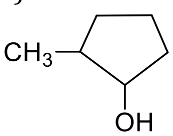
b) 

c) 

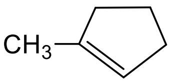
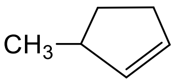
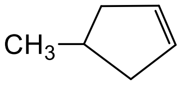
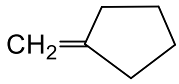
d) 

467. The product formed during the reaction,
$CH \equiv CH + NaOCl \xrightarrow{0°C}$ is:
a) 1,2-dichloroethane b) 1,2-dichloroethanal c) 1,2-dichloroethene d) 1,2-dichloroethyne

468. Out of the following fractions of petroleum the one having the lowest boiling point is:
a) Kerosene b) Diesel oil c) Gasoline d) Heavy oil

469. 

$\xrightarrow{POCl_3}$ A (major), A is

a)  b)  c)  d) 

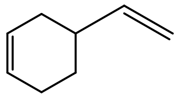
470. Acetylene on reacting with hypochlorous acid gives:
a) CH_3COCl b) $ClCH_2CHO$ c) $Cl_2CH.CHO$ d) $ClCH_2COOH$

471. 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}

472. $R—CH{=}CH_2 \xrightarrow[C_2H_5OH]{Na/NH_3(l)} RCH_2CH_3$ is called:
a) Clemmensen reduction
b) Fisher-Spier reduction
c) Birch reduction
d) Arndt-Eistert reduction

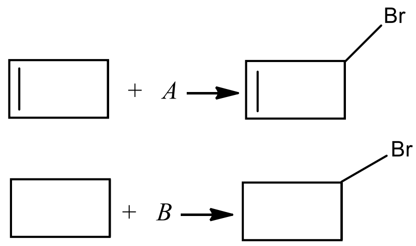
473. Which one of the following compounds will react with methyl magnesium iodide?
a) $CH_3CH_2CH_2CH_2CH_3$ b) $CH_3CH = CH - CH = CH_2$
c) $CH_3 - C \equiv C - CH_2CH_3$ d) $CH_3CH_2CH_2C \equiv CH$

474. Degree of unsaturation in the following compound is



a) 1° b) 2° c) 3° d) 4°

475. Suitable reagents A and B for the following reactions are



a) Br, Br_2 b) Br_2, NBS c) NBS, NBS d) NBS, Br_2

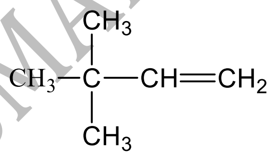
476. During ozonolysis of $CH_2 = CH_2$ if reduction is carried out by $LiAlH_4$ the products formed are:
a) HCHO b) HCOOH c) CH_3OH d) CH_2OHCH_2OH

477. Ethyl hydrogen sulphate is obtained by reaction of H_2SO_4 on:
a) Ethylene b) Ethane c) Ethyl chloride d) Ethanal

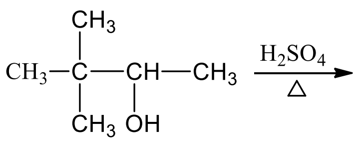
478. When HCI gas is passed through propene in the presence of benzoyl peroxide, it gives:
a) n-propyl chloride b) 2-chloropropane c) Allyl chloride d) No reaction

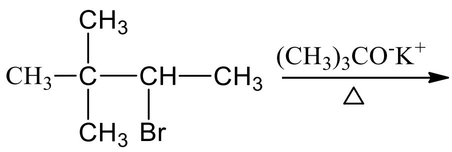
479. Hydrocarbon which is liquid at room temperature is
a) Pentane b) Butane c) Propane d) Ethane

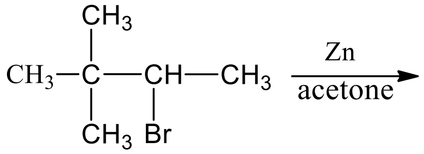
480. Which of the following reactions are not expected to give



In yields of more than 50%?

a) 

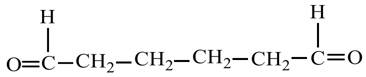
b) 

c) 

d) None of the above

481. Incorrect name of an alkyne is:
a) Propyne b) But-2-yne c) Pent-3-yne d) But-1-yne

482. The alkyne which gives pyruvic acid ($CH_3COCOOH$) on oxidation with alk. $KMnO_4$ is:
a) $CH \equiv CH$ b) $CH_3C \equiv CH$ c) $CH_3C \equiv C—CH_3$ d) $CH_3—CH_2—C \equiv CH$

483. A hydrocarbon of formula C_6H_{10} absorbs only one molecule of H_2upon catalytic hydrogenation. Upon ozonolysis the hydrocarbon yields,

The hydrocarbon is :
a) Cyclohexane b) Benzene c) Cyclohexene d) Cyclobutane

484. Alkyl halides react with dialkyl copper reagents to give
a) Alkenyl halides b) Alkanes
c) Alkyl copper halides d) Alkenes

485. $A \xrightarrow{O_3/Zn,\ H_2O} (CH_3)_2CO + HCHO + \begin{matrix} CHO \\ | \\ CHO \end{matrix}$
Thus, A is
a) $(CH_3)_2CHCH = CHCH = CH_2$ b) $(CH_3)_2C = CH - CH = CH_2$
c) $CH_3CH = CH - CH = CH - CH = CH_2$ d) none of the above

486. In the series,
$C_2H_5 \xrightarrow{NaNH_2} X \xrightarrow{CH_3I} Y \xrightarrow[H_2SO_4,H_2O]{HgSo_4} Z$
The compound $Z$is
a) $CH_3CH_2CH = CH_2$ b) CH_3COCH_3 c) CH_3CHO d) $CH_3CH_2CH_2CHO$

487. Paraffin dissolves in:
a) Distilled water b) Benzene c) Methanol d) Salt water

488. Which cannot be prepared by Kolbe's electrolytic reaction using single salt?
a) CH_4 b) C_2H_6 c) C_4H_{10} d) H_2

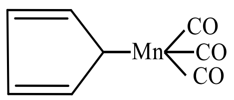
489. Which will react with$NaBH_4$?
a) Benzoic acid b) Benzamide c) Cyclohexanone d) Acetic acid

490. When methane is made to react with a halogen (X_2), halides are formed, the order of reactivity is:
a) $F_2 > Cl_2 > Br_2 > I_2$ b) $Cl_2 > F_2 > Br_2 > I_2$ c) $I_2 > Br_2 > Cl_2 > F_2$ d) $Cl_2 > F_2 > I_2 > Br_2$

491. Which of these does not follow *anti* −Markownikoff's rule?
a) 2-butene b) 1-butene c) 2-pentene d) 2-hexene

492. Acetylene reacts with HCN in the presence of $Ba(CN)_2$ to yield
a) 1,1-dicyanoethane b) 1,2-dicyanoethane c) Vinyl cyanide d) None of these

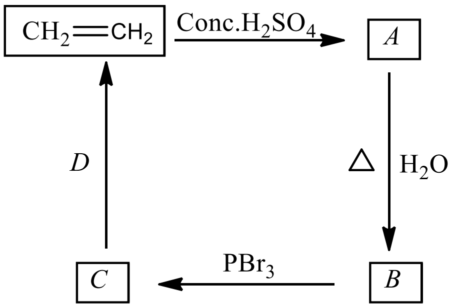
493. An alkyl bromide (X) reacts with Na to form 4, 5-diethyl octane. Compound (X) is:
a) $CH_3(CH_2)_3Br$
b) $CH_3(CH_2)_5Br$
c) $CH_3(CH_2)_3CHBr.CH_3$
d) $CH_3(CH_2)_2CHBrCH_2CH_3$

494. To avoid lead pollution, a new anti-knock compound is used. It is:
a) 
b) Cyclopentadienyl manganese carbonyl

c) AK-33-X

d) All of the above

495. Identify B and D in the following sequence of reactions.



a) Methanol and bromoethane
b) Ethyl hydrogen sulphate and alcoholic KOH
c) Ethyl hydrogen sulphate and aqueous KOH
d) Ethanol and alcoholic KOH

496. Angle strain in cyclopropane is

a) $24°44'$
b) $9°44'$
c) $44'$
d) $-5°16'$

497. When propyne react with H_2O in presence of dil. H_2SO_4 and $HgSO_4$ product formed is

a) Acetone
b) Acetaldehyde
c) Acetic acid
d) Ethyl alcohol

498. Which of the following compounds cannot be prepared singly by the Wurtz reaction?

a) C_2H_6
b) $(CH_3)_2CHCH_3$
c) $CH_3CH_2CH_2CH_3$
d) All can be prepared

499. The olefin which on ozonolysis gives CH_3CH_2CHO and CH_3CHO is:

a) 1-butene
b) 2-butene
c) 1-pentene
d) 2-pentene

500. Which statement is false?

a) Peroxide effect is applicable only for HBr and not for the other halogen halides
b) Meta directing groups are deactivating groups
c) Chlorination of methane follows an ionic mechanism
d) In benzene the C atoms are sp^2-hybridized

501. The presence of unsaturation (olefinic or acetylinic bond) in an organic compound can be tested with:

a) Schiff's reagent
b) Tollen's reagent
c) Fehling's solution
d) Baeyer's reagent

502. An alkene on reductive ozonolysis gives 2-molecules of $CH_2(CHO)_2$. The alkene is

a) 2,4-hexadiene
b) 1,3-cyclohexadiene
c) 1,4-cyclohexadiene
d) 1-methyl-1, 3-cyclopentadiene

503. A mixture of ethyl iodide and n-propyl iodide is subjected to Wurtz reaction. The hydrocarbon that will not be formed is:

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

504. Which of the following reacts with benzene in presence of anhydrous aluminium chloride and forms acetophenone?

a) CH_3Cl
b) CH_3COOH
c) CH_3CHO
d) CH_3COCl

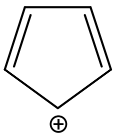
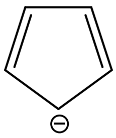
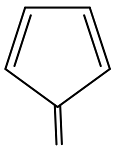
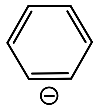
505. Oxidation of 1-butene with hot $KMnO_4$ solution produces

a) $CH_3CH_2COOH + HCOOH$
b) $CH_3CH_2COOH + CO_2$
c) $CH_3COOH + CO_2$
d) $(CH_3)_2C = O + CO_2$

506. Action of Br_2 on cyclopentene gives:

a) 1,2-dibromo cyclopentane
b) Cyclopentyl bromide
c) Cyclopentyl dibromide
d) No reaction

507. Which of the following species is aromatic?

a)  b)  c)  d) 

508. Propene, $CH_3 - CH = CH_2$ can be converted into 1-propanol by oxidation. Which set of reagents among the following is ideal to effect the conversion?
a) Alkaline $KMnO_4$ b) B_2H_6 and alk. H_2O_2 c) O_3/zinc dust d) $OsO_4/CHCl_3$

509. Compound which gives acetone on ozonolysis
a) $CH_3 - CH = CH - CH_3$ b) $(CH_3)_2C = C(CH_3)_2$
c) $C_6H_5CH = CH_2$ d) $CH_3CH = CH_2$

510. Toluene, when treated with Br_2/Fe, gives p-bromotoluene as the major product because the $-CH_3$ group
a) Is *meta* directing b) deactivates the ring
c) activates the ring by hyperconjugation d) None of the above

511. Alkynes occur in nature in the:
a) Free state b) Partially free state c) Not in the free state d) None of the above

512. Which of the following will have least hindered rotation about carbon-carbon bond?
a) Ethane b) Ethylene c) Acetylene d) Hexachloroethane

513. Identify Z in the series,
$$CH_2 = CH_2 \xrightarrow{HBr} X \xrightarrow{aq.KOH} Y \xrightarrow[I_2\text{excess}]{NaCO_3} Z$$
a) C_2H_5I b) C_2H_5OH c) CHI_3 d) CH_3CHO

514. Action of NH_3 over C_2H_2 at high temperature gives:
a) Amine b) Furan c) Thiophene d) Pyrrole

515. Wurtz reaction converts alkyl halide into alkane when it is made to react with
a) Na in alcohol b) Na in dry ether c) Zn in alcohol d) Zn in dry ether

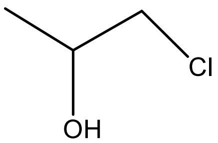
516. Polyethylene is a resin obtained by polymerization of:
a) Butadiene b) Ethylene c) Isoprene d) Styrene

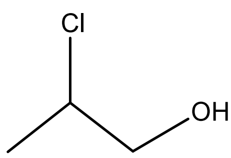
517. Cyclohexane (C_6H_{12}) a hydrocarbon, floats on water because:
a) It is immiscible with water
b) Its density is less than that of water
c) It is a non-polar substance
d) It is immiscible and lighter than water

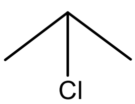
518. Which of the following are produced from coaltar?
a) Synthetic dyes b) Drugs c) Perfumes d) All of these

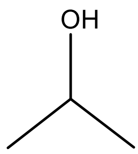
519. The reduction of an alkyne to alkene using lithium metal in liquid ammonia as solvent results into
a) *cis* addition of hydrogen atoms
b) *trans* addition of hydrogen atoms
c) Both *cis* and *trans* additions of hydrogen atoms. The relative amounts of the two depends on temperature
d) Both *cis* and *trans* additions of hydrogen atoms. The relative amounts depend on the nature of alkyne

520. Propene on reaction with hypochlorous acid to give

a) 

b) 

c) 

d) 

521. A mixture of nitrogen and acetylene, on passing electric spark through it gives:

a) Hydrogen and carbon b) Hydrogen cyanide c) Nitromethane d) Nitroethane

522. In the sequence of reactions,

$C_2H_4 \xrightarrow{HBr} X \xrightarrow{AgCN} Y \xrightarrow[H_2/Ni]{(H)} Z,$

Compound Z is

a) N-methyl ethanamine
b) N-propylamine
c) N, N-dimethylamine
d) Ethyl cyanide

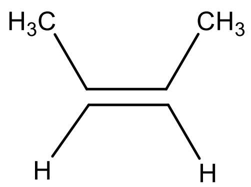
523. Which one of these is not true for benzene?

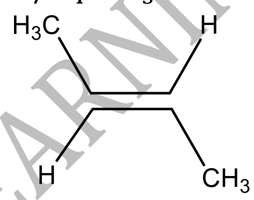
a) It forms only one type of monosubstituted product.
b) There are three carbon-carbon single bonds and three carbon-carbon double bonds
c) The heat of hydrogenation of benzene is less than the theoretical value.
d) The bond angle between the carbon-carbon bonds is 120°.

524. Presence of a nitro group in a benzene ring

a) Activates the ring towards electrophilic substitution
b) Renders the ring basic
c) Deactivates the ring towards nucleophilic substitution
d) Deactivates the ring towards electrophilic substitution

525. The major product in the reaction of 2-butyne with Li/liq. NH_3 is

a) 

b) 

c) $CH_3CH_2CH_2CH_3$
d) $H_2C = CH - CH_2 - CH_3$

526. Hydrocarbon liquid at STP is:

a) Ethane b) Propane c) Butane d) Pentane

527. Chlorination of benzene is not possible in the following reaction

a) $C_6H_6 + Cl_2 \xrightarrow{FeCl_3}$ b) $C_6H_6 + HOCl \xrightarrow{H^+}$ c) $C_6H_6 + I - Cl \xrightarrow{ZnCl_2}$ d) $C_6H_6 + Cl_2 \xrightarrow{AlCl_3}$

528. In the series, ethane, ethene and ethyne, the C-H bond energy is

a) Same in all the three compounds
b) Greatest in ethane
c) Greatest in ethene
d) Greatest in ethyne

529. The shape of 2-butene is:

a) Linear b) Planar c) Tetrahedral d) Pyramidal

530. The substance used as an anti-knock compound is:

a) Tetraethyl lead b) Lead tetrachloride c) Lead acetate d) Ethyl acetate

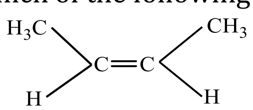
531. Petroleum refining is:

a) Obtaining aromatic compounds from aliphatic compounds in petroleum
b) Cracking of petroleum to get gaseous hydrocarbons
c) Purification of petroleum
d) Distillation of petroleum to get different fractions

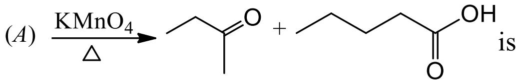
532. Zinc-copper couple that can be used as a reducing agent is obtained by:

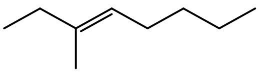
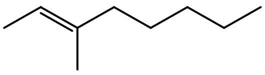
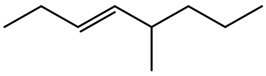
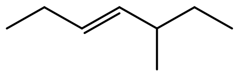
a) Mixing zinc dust and copper gauze
b) Zinc coated with copper
c) Copper coated with zinc
d) Zinc and copper wires welded together

533. Which of the following hydrocarbons has the lowest dipole moment?

a) 

b) $CH_3C \equiv CCH_3$ c) $CH_3CH_2C \equiv CH$ d) $CH_2 = CH—C \equiv CH$

534. 
Alkene

a)  b)  c)  d) 

535. A solution of sodium salt of fatty acid was electrolysed during Kolbe's reaction. The solution left after electrolysis is:
a) Richer in NaOH b) Richer in H_2SO_4 c) Richer in sodium salt d) All of these

536. Sample of 2,3-dibromo-3-methylpentane is heated with zinc dust. The resulting product is isolated and heated with HI in the presence of phosphorus. Indicate which is the structure that represents the final organic product in the reaction?

a) $CH_2{=}CH{-}\underset{\displaystyle CH_3}{\underset{|}{CH}}{-}CH_2{-}CH_3$

b) $CH_3{=}CH_2{-}\underset{\displaystyle CH_3}{\underset{|}{CH}}{-}CH_2{-}CH_3$

c) $CH_3{=}\underset{\displaystyle I}{\underset{|}{CH}}{-}\underset{\displaystyle CH_3}{\underset{|}{CH}}{-}CH_2{-}CH_3$

d) $CH_2{=}CH{-}\underset{\displaystyle CH_3}{\underset{|}{CH}}{-}CH_2{-}CH_3$

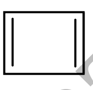
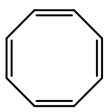
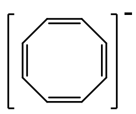
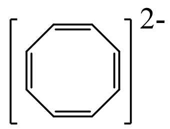
537. Which compound does not give precipitate with ammoniacal silver nitrate solution?
a) $C_2H_5-C\equiv CH$ b) $CH_3-C\equiv C-CH_3$
c) $CH_3-\overset{\displaystyle CH_3}{\overset{|}{CH}}-C\equiv CH$ d) $Ph-CH_2-C\equiv CH$

538. Hydroxylation of propyne in the presence of $HgSO_4/H_2SO_4$ is initiated by the attack of:
a) Carbene b) Free radical c) Electrophile d) Nucleophile

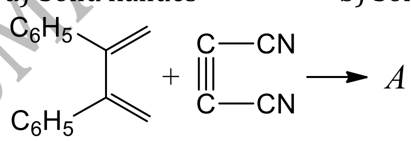
539. Benzene vapour mixed with air when passed over V_2O_5 catalyst at 775 K gives
a) Glyoxal b) Oxalic acid c) Maleic anhydride d) Fumaric acid

540. Kolbe's synthesis on electrolysis of sodium salt of butanoic acid gives :
a) n-hexane b) Isobutene c) Butane d) Ethene

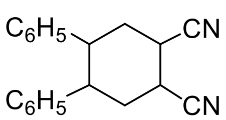
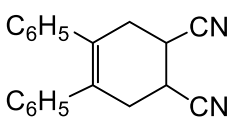
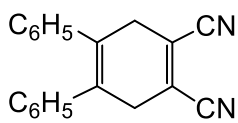
541. Which among the following is aromatic?

a)  b)  c)  d) 

542. The neutral wax called Ozokerite found near petroleum well is a mixture of:
a) Solid halides b) Solid hydrocarbons c) Solid alcohols d) None of these

543. 

Identify A:

a)  b)  c)  d) None of these

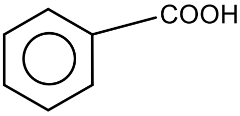
544. Which among the following are used as catalyst in cracking?

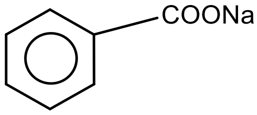
a) Oxides of Al b) Oxides of Cr, Mo c) Oxides of V d) All of these

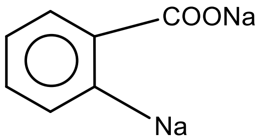
545. The general formula of a cycloalkane is

a) C_nH_n b) C_nH_{2n} c) C_nH_{2n-2} d) C_nH_{2n+2}

546. Toluene reacts, with excess of Cl_2 in presence of sunlight to give a product, which on hydrolysis followed by reaction with NaOH gives

a) 

b) 

c) 

d) None of these

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

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

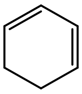
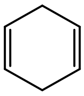
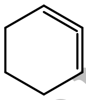
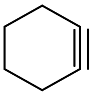
548. When propionic acid is treated with aqueous sodium bicarbonate, CO_2 is liberated. The 'C' of CO_2 comes from:

a) Methyl group b) Carboxylic group c) Methylene group d) Bicarbonate

549. 10mL of a certain hydrocarbon require 25mL of oxygen for complete combustion and the volume of CO_2 produced is 20mL. what is the formula of hydrocarbon?

a) C_2H_2 b) C_2H_4 c) CH_4 d) C_2H_6

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

a) 
b) 
c) 
d) 

551. The octane number of any fuel increases with:

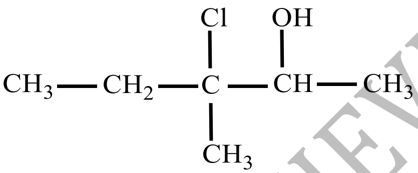
a) Increase in n-heptane

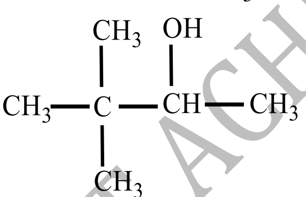
b) Decrease in 2,2,4-trimethylpentane

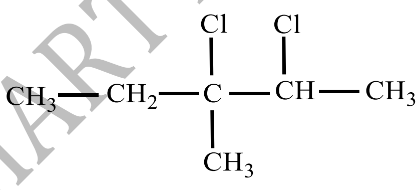
c) Increase in 2,2,4-trimethylpentane

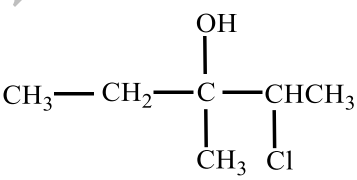
d) None of the above

552. 3-methyl-2-pentene on reaction with HOCl gives:

a) 

b) 

c) 

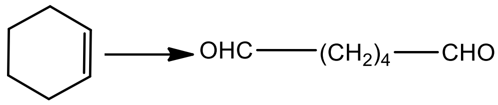
d) 

553. The reaction of propene with HOClproceeds *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

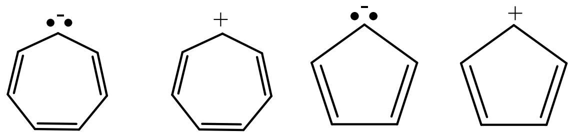
554. Select the reagent for the following reaction,



a) SeO_2
b) $O_3, Zn/H_2O$
c) $O_3, H_2O_2 - CH_3COOH$
d) PCC

555. The chemical reactivity of ethylene is due to:
a) Short carbon to carbon bond distance
b) High double bond energy
c) Trigonal planar structure
d) Presence of π-electrons

556. Which of the following species could be expected to exhibit aromatic character?



I II III IV

Select the correct answer from the following
a) I and IV
b) II and IV
c) I and III
d) II and III

557. Product formed when 1-butene is subjected to HBr in the presence of peroxide:
a) 1-bromobutane
b) 2-bromobutane
c) 1,1-dibromobutane
d) 1,2-dibromobutane

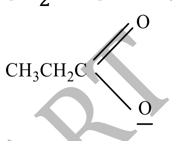
558. Nitrobenzene can be prepared from benzene by using a mixture of concentrated HNO_3 and concentratedH_2SO_4. In the nitrating mixture, HNO_3 acts as
a) Base
b) Acid
c) Reducing agent
d) Catalyst

559. In the reaction sequence,

$CH_3CH = CH_2 \xrightarrow[\text{(ii)}H_2O/Zn]{\text{(i)}O_3}$ Products Products will be

a) CH_3COCH_3
b) CH_3COCH_2OH
c) $CH_3COOH + HCOOH$
d) $CH_3CHO + HCHO$

560. Petrol or gasoline used as an automobile fuel is a mixture of:
a) Hydrocarbons
b) Alcohols
c) Carbohydrates
d) Hydrocarbons and alcohols

561. In which of the following electron delocalisation is possible?
a) $CH_2 = CH - CH_2 - O^-$
b) 
c) $CH_2 = CH - CH_2 - CH = CH_2$
d) None of the above

562. The major component of L.P.G. is:
a) Methane
b) Ethane
c) Propane
d) Iso-butane

563. Which of the following alkenes will yield 2-butanone on ozonolysis followed by the reaction withZn/H_2O?
a) 2-methyl-2-hexene
b) 2-methyl-1-hexene
c) 3,4-dimethyl-3-hexene
d) 2,3-dimethyl-3-hexene

564. Acetylene and ethylene reacts with alk. $KMnO_4$ to give:
a) Oxalic acid and formic acid
b) Acetic acid and ethylene glycol
c) Ethyl alcohol and ethylene glycol

d) None of the above

565. According to Markownikoff's rule, what will be the major product of reaction

$CH_2 = CH - CH_3 \xrightarrow{HBr} ?$

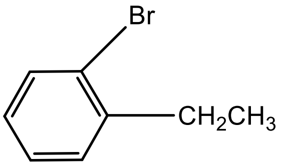
a) $CH_3 - CH(Br) - CH_3$ b) $Br - CH_2 - CH_2 - CH_3$

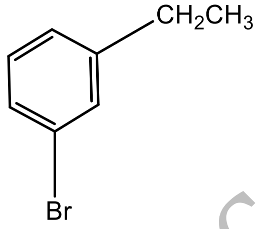
c) $CH_2 = CH - CH_2Br$ d) $CH_2 = C = CH_2$

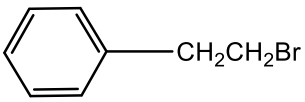
566. Carbon black, used in making printing ink is obtained by the oxidation of:

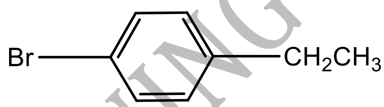
a) Acetylene b) Benzene c) Methane d) CCl_4

567. Ethylbenzene with bromine in presence of $FeBr_3$, predominantly gives

a) 

b) 

c) 

d) 

568. Which reaction produces acrylonitrile ($CH_2 = CHCN$)?

a) Ethyne $\xrightarrow[Ba^{2+}]{HCN}$ b) Acrylic acid $\xrightarrow{KCN}$ c) Ethyne $\xrightarrow{KCN}$ d) Ethyne $\xrightarrow{HOCl}$

569. Gasoline is:

a) C_3H_8 to C_6H_{14} b) C_7H_{16} to $C_{10}H_{22}$ c) C_7H_{24} to $C_{14}H_{34}$ d) $C_{17}H_{36}$ to $C_{21}H_{50}$

570. Which of the following gives methane [CH_4] on hydrolysis?

a) Fe_3O_4 b) Al_2O_3 c) CaC_2 d) Al_4C_3

571. The compound $(CH_3)_2CH—CHCl—CH_3$ reacts with alcoholic KOH to give the following alkene:

a) $(CH_3)_2CH—CH = CH_2$

b) $CH_3—CH = C = CH_2$

c) $CH_3—CH_2—CH = CHCH_3$

d) $(CH_3)_2C = CH—CH_3$

572. A hydrocarbon reacts with HI to give (X) which on reacting with aqueous KOH forms (Y). Oxidation of (Y) gives 3-methyl-2-butanone. The hydrocarbon is:

a) $CH_3CH=C(CH_3)-CH_3$ b) $CH_2=CH-CH(CH_3)-CH_3$ c) $CH_3-CH_2-C(CH_3)=CH_2$ d) $CH\equiv C-CH(CH_3)-CH_3$

573. Pure acetylene has sweet ethereal smell while impure smells like garlic due to presence of:

a) NH_3 b) PH_3 c) AsH_3 d) H_2S

574. An alkyl halide by formation of its Grignard reagent and heating with water yields propane. What is the original alkyl halide?

a) Methyl iodide b) Ethyl iodide c) Ethyl bromide d) Propyl bromide

575. 1-propyne on treatment with dilute H_2SO_4 in presence of $HgSO_4$ gives acetone. The change is due to:

a) Hyperconjugation b) Resonance c) Tautomerism d) None of these

576. O_2 required for complete oxidation of 1 litre of ethane at NTP is:

a) 3.5 litre b) 0.156 mole c) 5.00 g d) All of these

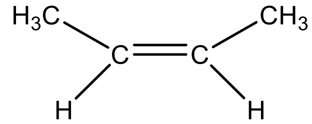
577. In the following sequence the product D is,

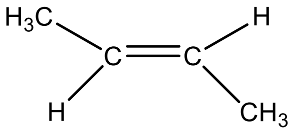
$CH \equiv CH \xrightarrow{HBr} A \xrightarrow{HBr} B \xrightarrow{\text{KOH ale.}} C \xrightarrow{NaNH_2} D$:

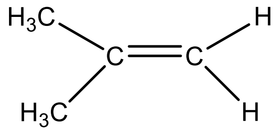
a) Ethanol b) Ethane c) Ethyne d) Ethanal

578. Which of the following compounds react with HBr obeying Markownikoff's rule?

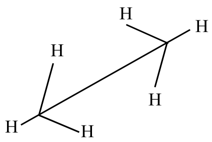
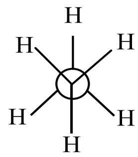
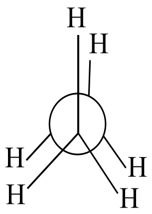
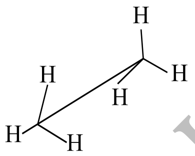
a) $CH_2 = CH_2$

b) 

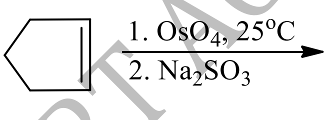
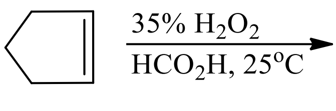
c) 

d) 

579. Liquid hydrocarbon can be converted to a mixture of gaseous hydrocarbon by:
    a) Oxidation
    b) Cracking
    c) Hydrolysis
    d) Distillation under reduced pressure
580. Two jars A and B are filled with hydrocarbons. Br_2 in CCl_4 is added to these jars. A does not decolourise the Br_2 solution but B decolourises. What are A and B?
    a) Alkane and alkene b) Alkene and alkane c) Alkene and alkyne d) None of these
581. In the following structures which two forms are staggered conformation of ethane?

1. 
2. 
3. 
4. 

    a) 1 and 4 b) 2 and 3 c) 1 and 2 d) 1 and 3
582. A mixture of ethane, ethene and ethyne is passed through ammoniacal $AgNO_3$solution. The gases which remain unreacted are:
    a) Ethane and ethene b) Ethane and ethyne c) Ethene and ethyne d) Ethane only
583. In the reaction,
    $C_6H_5CH_3 \xrightarrow{\text{Oxidation}} A \xrightarrow{\text{NaOH}} B \xrightarrow{\text{Soda lime}} C$
    The product C is
    a) C_6H_5OH b) C_6H_6 c) C_6H_5COONa d) C_6H_5ONa
584. $A \xleftarrow[\text{(II)}H_2O_2, OH^-]{\text{(I) } BH_3.THF} CH_3C \equiv CH \xrightarrow[H_2SO_4]{HgSO_4} B$
    Identify A and B
    a) CH_3CHO, CH_3COCH_3 b) CH_3CH_2CHO, CH_3COCH_3
    c) $CH_3CH_2CHO, CH_3COCH_2CH_3$ d) $HCHO, CH_3COCH_3$
585. Cyclobutadiene is said to be
    a) aromatic b) aliphatic c) non-aromatic d) None of these
586. Acetylene reacts with hypochlorous acid to form
    a) Cl_2CHCHO b) $ClCH_2COOH$ c) Cl_3COCl d) $ClCH_2CHO$
587. To enable easy detection of gas leakage from cylinders, the substance added to L.P.G. is:
    a) Glycols b) Phenols c) Thioalcohols d) Glycerols
588. Octane no. of 2,3,3-trimethylbutane has been assumed to be:
    a) 100 b) −45 c) 124 d) Zero
589. C_4H_6 may contain
    a) One double bond b) Two double bond c) One triple bond d) Both (b) and (c)

590. Which of the following compounds can form metallic derivatives?
a) Ethane b) Propyne c) 2-butyne d) 2-butene
591. Increasing order of volatility of C_2H_6, C_2H_4, C_2H_2 and C_6H_6 is:
a) $C_6H_6, C_2H_6, C_2H_4, C_2H_2$ b) $C_2H_2, C_2H_4, C_2H_6, C_6H_6$ c) $C_6H_6, C_2H_2, C_2H_4, C_2H_6$ d) $C_2H_2, C_2H_6, C_2H_4, C_6H_6$
592. Octane no. of a fuel can be increased by:
a) Isomerism b) Alkylation c) Reforming d) All of these
593. 1-propanol on dehydration with H_2SO_4 produces:
a) $CH_3-CH=CH_2$
b) $CH_3-CH=CH-CH_3$
c) $CH_3CH_2CH_2OCH_2CH_2CH_3$
d) $CH_3CH_2CH_2CH_2CH=CH_2$
594. Propadiene, C_3H_4 molecule contains:
a) Two $sp^2$and one sp-hybrid carbon
b) One sp^2 and two sp-hybrid carbons
c) One sp^2 and three sp-hybrid carbons
d) None of the above
595. Catalyst used in dimerization of acetylene to prepare chloroprene is:
a) $HgSO_4 + H_2SO_4$ b) Cu_2Cl_2 c) $Cu_2Cl_2 + NH_4Cl$ d) $Cu_2Cl_2 + NH_4OH$
596. Cyclopentene on treatment with alkaline $KMnO_4$ gives:
a) Cyclopentanol
b) *trans*-1,2-cyclopentanediol
c) *cis*-1,2-cyclopentanediol
d) 1 : 1 mixture of *cis*-and *trans*-1,2-cyclopentanediol
597. $C_7H_8 \xrightarrow{3Cl_2,\text{Heat}} A \xrightarrow{Fe/Br_2} B \xrightarrow{Zn/HCl} C$
Here, the compound C is
a) 3-bromo 2,4,5,6-trichlorotoluene b) *o*-bromo toluene
c) *p*-bromo toluene d) *m*-bromo toluene
598. Naphalene is an example of
a) Polynuclear hydrocarbon b) alicyclic compound
c) heterocyclic compound d) aliphatic compound
599. Which of the following will give *trans*-diols?
a) $>C=C< \xrightarrow[2.\ H_2O]{1.\ KMnO_4}$
b) $>C=C< \xrightarrow[2.\ Na_2SO_3]{1.\ OsO_4}$
c) 
d) 

600. Benzene can react with
a) Bromine water b) HNO_3 c) H_2O d) CH_3OH
601. A mixture of methane and steam when passes over nickel supported on alumina catalyst at 725°C gives:
a) CH_3OH b) CO_2 and H_2 c) CO and H_2 d) None of these
602. In which reaction addition takes place according to Markownikoff's rule?
a) $CH_3CH=CH_2 + Br_2 \longrightarrow$
b) $CH_3CH=CH_2 + HBr \longrightarrow$
c) $CH_2=CH_2 + HBr \longrightarrow$
d) $CH_3CH=CHCH_3 + Br_2 \longrightarrow$
603. Paraffin wax is:
a) Ester b) Alcohol c) Unsaturated hydrocarbon d) Saturated hydrocarbon

604. Propyne when passed through a hot iron tube at 400°C produces
a) Benzene
b) Methyl benzene
c) Dimethyl benzene
d) Trimethyl benzene

605. Which of the following is called Marsh gas?
a) C_2H_4
b) C_2H_6
c) C_2H_2
d) CH_4

606. Which can be easily oxidized?
a) Alkene
b) 1-alkyne
c) Alkane
d) Benzene

607. n-butane and isobutene, which have same number of hydrogen and carbon atoms in their molecules, boil at different temperatures because:
a) n-butane is much hotter
b) Their volumes are different
c) Isobutene is an alkene
d) Their atoms are not having the same carbon chain

608. Common oxidizing agents used in organic chemistry are:
a) Fenton's reagent
b) Osmium tetraoxide
c) Acidified $KMnO_4$
d) Alkaline $KMnO_4$

609. Acetylenic hydrocarbons are acidic because:
a) Sigma electron density of C—H bond in acetylene is nearer a carbon which has 50% s-character
b) Acetylene has only one hydrogen atom at each carbon atom
c) Acetylene contains least number of hydrogen atoms among the possible
d) Acetylene belongs to the class of alkynes with formula C_nH_{2n-2}

610. Butene -1 may be converted to butane by the reaction with:
a) Zn–Hg
b) Pd–H_2
c) Zn–HCI
d) Sn–HCI

611. Number of acidic hydrogen atom in butyne-1 is:
a) 2
b) 3
c) 1
d) 4

612. Propene on reaction with methylene iodide in presence of Zn-Cu couple gives:
a) Cyclopropane
b) Cyclopropene
c) Methyl cyclopropane
d) Cyclobutene

613. Addition of O_2 on ethylene in presence of Ag at 200°C forms:
a) Epoxy ethane
b) Oxiranes
c) Cyclic ethers
d) All of these

614. The carbon-carbon bond distance in benzene is
a) Longer than a $C-C$ single bond
b) Longer than a $C=C$ double bond
c) Shorter than a $C=C$ double bond
d) Shorter than a $C\equiv C$ triple bond

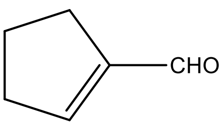
615. Method of converting high boiling hydrocarbons into low boiling hydrocarbons is called:
a) Polymerisation
b) Isomerisation
c) Cracking
d) Condensation

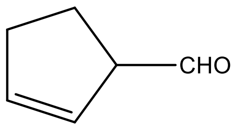
616. The mechanism of Wurtz reaction involves:
a) Free radical
b) Carbocation
c) Carbanion
d) None of these

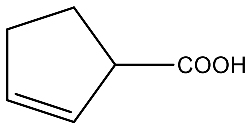
617. The most important energy yielding constituent in biogas is:
a) C_2H_4
b) C_2H_2
c) CH_4
d) H_2S

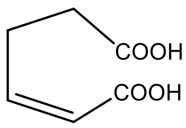
618. PVC is a polymer of:
a) $CH_2=CH_2$
b) $ClCH_2—CH_2Cl$
c) $CH_2—CHCl$
d) $Cl—C=C—Cl$

619. Cyclohexene on ozonolysis followed by reaction with zinc dust and water gives compound E. Compound E on further treatment with aqueous KOH yields compound F. Compound F is

a) 

b) 

c) 

d) 

620. The flash point in India is fixed at:
a) 44°C
b) 35°C
c) 22.8°C
d) 30°C

621. Lindlar's catalyst is:
a) Pd- $CaCO_3$ deactivated by lead acetate
b) $Pd-BaSO_4$

c) Pd

d) None of the above

622. The energy of π-bond in kcal is about :

a) 36 b) 50 c) 74 d) 140

623. Ozonolysis (O_3, H_2O) of,

$$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-C\equiv C-CH_3 \text{ gives:}$$

a) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}HCOOH + CH_3COOH$

b) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}HCHO + CH_3CHO$

c) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{C}}HCHO + CH_3COOH$

d) None of the above

624. What is the end product of the following sequences of operations?

$$CaC_2 \xrightarrow{H_2O} A \xrightarrow[Hg^{2+}]{Dil.H_2SO_4} B \xrightarrow[H_2]{Ni} C$$

a) Methyl alcohol b) Acetaldehyde c) C_2H_5OH d) C_2H_4

625. The order of relative acidic strengths of water, ethyne and propyne is:

a) Water>propyne>ethyne

b) Propyne>ethyne>water

c) Water>ethyne>propyne

d) Ethyne>water>propyne

626. Reaction of *trans*-2-phenyl-1-bromocyclopentane on reaction with alcoholic KOH produces:

a) 4-phenylcyclopentene

b) 2-phenylcyclopentene

c) 1-phenylcyclopentene

d) 3-phenylcyclopentene

627. Ethylene reacts with slphur monochloride to give:

a) Phosgene b) Mustard gas c) Ethylene chloride d) None of these

628. The dihalogen derivative 'X' of a hydrocarbon with three carbon atoms reacts with alcoholic KOH and produces another hydrocarbon which forms a red precipitate with ammoniacal Cu_2Cl_2. 'X' gives an aldehyde on reaction with aqueous KOH. The compound 'X' is

a) 1,3-dichloropropane b) 1,2-dichloropropane

c) 2,2-dichloropropane d) 1,1-dichloropropane

629. Ethylene may be prepared by the dehydration of:

a) Ethyl alcohol b) Methyl alcohol c) Acetic acid d) Oxalic acid

630. Petroleum is formed by the chemical changes in:

a) Inorganic matter b) Vegetable matter c) Animal matter d) Both (b) and (c)

631. Common dehydrating agents for alkanes are:

a) H_2SO_4 b) Al_2O_3 c) $ZnCl_2$ d) All of the above

632. The most stable conformation of butane is:

a) Skew b) Staggered c) Gauche d) Eclipsed

633. A cyclic hydrocarbon molecule has all the carbon and hydrogen in a single plane. All the carbon-carbon bonds are of same length, less than 1.54Å, but more than 1.34Å. The C-c bond angle will be

a) $109°28'$ b) $100°$ c) $180°$ d) $120°$

634. The product of acid catalysed hydration of 2-phenyl propene is:
a) 3-phenyl-2-propanol b) 1-phenyl-2-propanol c) 2-phenyl-2-propanol d) 2-phenyl-1-propanol

635. When C_2H_5, CH_4 and C_2H_4 passes through a test tube which have ammoniacal Cu_2Cl_2, find out which gas comes out unaffected from test tube?
a) C_2H_2 and CH_4 b) C_2H_2 and C_2H_4 c) C_2H_4 and CH_4 d) C_2H_2

636. Benzene reacts with chlorine in sunlight to give a final product
a) CCl_4 b) $C_6H_6Cl_6$ c) C_6Cl_6 d) C_6H_5Cl

637. When 2-butyne is treated with $Pd - BaSO_4$; the product formed will be
a) *cis*-2-butene b) *trans*-2-butene c) 1-butene d) 2-hydroxy butane

638. The overlapping of orbitals in benzene is of the type
a) $sp - sp$ b) $p - p$ c) $sp^2 - sp^2$ d) $sp^3 sp^3$

639. The product obtained when methyl magnesium bromide reacts with methyl alcohol is:
a) Acetone b) Alcohol c) Methane d) Ethane

640. The treatment of benzene with benzoyl chloride in the presence of $AlCl_3$ gives
a) Benzaldehyde b) Benzophenone c) Diphenyl d) Cyclohexane

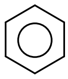
641. Which of the following have delocalised electron?
a) Benzene b) Cyclohexane c) CH_4 d) C_2H_6

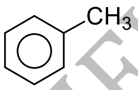
642. The IUPAC name of $CH_2 = CH—CH_2—$group is:
a) Allyl b) Propyl c) Prop-2-enyl d) Prop-1-enyl

643. Which statement is correct?
a) Low chemical reactivity of alkanes is due to strong C—C and C—H bonds
b) Alkanes show characteristic substitution reactions because they are saturated
c) Reaction of alkanes with fluorine is explosive even in dark
d) All of the above

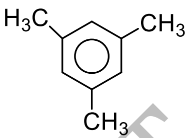
644. Ease of sulphonation of alkanes is:
a) 3°>2°>1° b) 1°>2°>3° c) 2°>3°>1° d) 3°>1°>2°

645. Arrange the following in order of decreasing boiling point

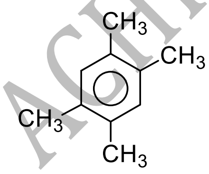

I



II



III

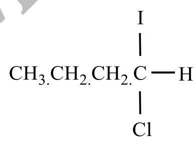


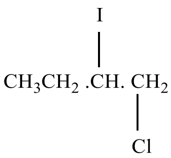
IV

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

646. The product B is:

$CH_3.CH_2.C = CH + HCI \longrightarrow B \xrightarrow{HI} C$

a) 

b) 

c) $CH_3CH_2C \equiv CH$ d) $CH_3CH=CHCH_3$

647. n-propyl bromide on treating with alcoholic KOH produces
a) Propane b) Propene c) Propyne d) Propanol

648. An unsaturated hydrocarbon upon ozonolysis gives one mole each of formaldehyde, acetaldehyde and methylglyoxal(CH_3COCHO). The structure of the hydrocarbon is
a) $CH_2 = CH - CH_2 - CH = CH_2$ b) $CH_2 = CH - C(CH_3) = CH - CH_3$

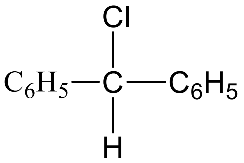
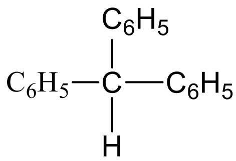
c) $(CH_3)_2C = CH - CH_3$ d) $CH_3 - CH = C(CH_3) - CH_3$

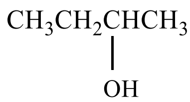
649. Fischer-Tropsch process is used in the manufacture of:
a) Synthetic petrol b) Ethanol c) Benzene d) Ethanoic acid

650. 2-methylpropene is isomeric with butane-1. They can be distinguished by:
a) Baeyer's reagent b) Ammoniacal $AgNO_3$ c) Br_2 solution d) $O_3, Zn/H_2O$

651. Acetylene reacts with 42% H_2SO_4 containing 1% $HgSO_4$ to give:
a) $C_2H_5HSO_4$ b) CH_3CHO c) HCHO d) $CH_2 = CH_2$

652. The simplest alkyne is:
a) CH b) CH_2 c) C_2H_2 d) C_2H_4

653. A Friedel-Crafts reaction of benzene with chloroform produces
a) $C_6H_5CHCl_2$ b)  c)  d) All of these

654. An alkene, obtained by the dehydration of an alcohol (A), on ozonolysis gives two molecules of acetaldehyde for every molecule of alkene. The alcohol (A) is:
a) $CH_3CH_2CH_2OH$ b) CH_3CH_2OH c) $CH_3CH = CHCH_2OH$ d) 

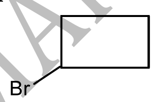
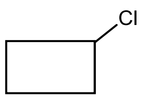
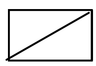
655. Which of the following annulenes is *anti*-aromatic?
a) Benzene b) Cyclobutadiene c) Cyclodecapentene d) Cyclooctatetraene

656. The number of possible isomers of alkane with formula C_6H_{14} is:
a) 2 b) 3 c) 4 d) 5

657. Which statement is correct?
a) Alkanes from CH_4 to C_4H_{10} are colourless odourless gases
b) Alkanes from $C_5H_{12}$to $C_{17}H_{36}$are colourless liquids
c) All alkanes are lighter than water
d) Melting point of alkanes increases with increase in the number of carbon atoms

658. Which compound does not decolourize bromine dissolved in carbon tetrachloride?
a) C_2H_2 b) C_3H_6 c) C_6H_6 d) C_2H_4

659. The principal organic product formed in the reaction,
$CH_2 = CH(CH_2)_8COOH + HBr \xrightarrow{\text{Peroxide}}$.....is:
a) CH_3— $CHBr(CH_2)_8COOH$
b) $CH_2 = CH(CH_2)_8COBr$
c) $CH_2BrCH_2(CH_2)_8COOH$
d) $CH_2 = CH(CH_2)_7CHBrCOOH$

660. What would be the product formed when 1-bromo-3-chlorocyclobutane reacts with two equivalents of metallic sodium in ether?
a)  b)  c)  d) 

661. $[A] \xleftarrow[\text{catalyst}]{\text{Lindlar's}} CH_3 - C \equiv C - CH_3 \xrightarrow[\text{liq.}NH_3]{\text{Na in}} [B]$
[A] and [B] are respectively
a) *cis*, *trans*-2-butene b) Both *trans*-2-butene
c) *trans*, *cis*-2-butene d) Both *cis*-2-butene

662. Which of the following reacts with $KMnO_4$ but does not react with$AgNO_3$?
a) C_2H_6 b) CH_4 c) C_2H_4 d) C_2H_2

663. Octane number 116 is given for:

a) 2,2,2-trimethyl pentane
b) 2,3,4-trimethyl pentane
c) 2,2,3-trimethyl butane
d) 2,2,4-trimethyl butane

664. Which of the following statements is incorrect?
a) Acetylene is explosive above 2 atm
b) It is transported by dissolving in acetone
c) It has unpleasant garlic odour
d) It is used in the manufacture of Lewisite

665. Formation of ethylene from ethyl bromide is a case of:
a) Addition reaction
b) Substitution reaction
c) Elimination reaction
d) Rearrangement reaction

666. The most stable alkene is,
a) $R_2C = CR_2$ b) $RCH = CHR$ c) $CH_2 = CH_2$ d) $RCH = CR_2$

667. Ethylene can be prepared by electrolysis of an aqueous solution of:
a) Sodium acetate b) Sodium succinate c) Sodium fumarate d) Sodium propionate

668. HBr reacts with $CH_2 = CH - OCH_3$ under anhydrous conditions at room temperature to give
a) CH_3CHO and CH_3Br
b) $BrCH_2CHO$ and CH_3OH
c) $BrCH_2 - CH_2 - OCH_3$
d) $H_3C - CHBr - OCH_3$

669. Identify Z in the following series?
$CH_2 = CH_2 \xrightarrow{\text{HBr}} X \xrightarrow{\text{Hydrolysis}} Y \xrightarrow[\text{I}_2 \text{ excess}]{\text{Na}_2\text{CO}_3} Z$
a) C_2H_5I b) CHI_3 c) CH_3CHO d) C_2H_5OH

670. Reactive species in halogenation of benzene in cold and dark
a) $Cl^{\bullet}$ b) Cl^+ c) Cl^- d) None of these

671. An organic alkadiene on reductive ozonolysis produces
(i)acetaldehyde
(ii)acetone
(iii)2-methylpropane-1, 3-dial
The formula of alkadiene will be

a)
$CH_3C = CHCHCH = CHCH_3$
  | |
 CH_3 CH_3

b)
$CH_3CHCH = CCH = CHCH_3$
  | |
 CH_3 CH_3

c)
$CH_3C = CHCHC = CHCH_3$
  | |
 CH_3 CH_3

d)
$CH_3CH_2CHCH = CHC = CH_2$
  | |
 CH_3 CH_3

672. Synthetic petrol and kerosene can be obtained by passing……under heat and pressure over coal.
a) O_2 b) H_2 c) N_2 d) CO_2

673. A hydrocarbon containing 2 carbon atoms give Sabatier and Senderen's reaction but does not give precipitate with ammoniacal silver nitrate solution. The hydrocarbon in question is:
a) Ethane b) Acetylene c) Ethylene d) None of these

674. Acetylene can be converted to higher alkyne using the following sequence of reactions:
a) Na, RX b) RMg X, R X c) Either of these two d) None of these

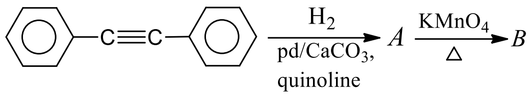
675. At low temperature, the slow addition of molecular bromine to $H_2C = CH— CH_2— C \equiv CH$ gives:
a) $CH_2 = CH— CH_2— CBr = CHBr$
b) $BrCH_2— CHBr— CH_2— C \equiv CH$
c) $H_2C = CH— CH_2— CH_2— CBr_3$

d) $CH_3—CBr_2—CH_2—C\equiv CH$

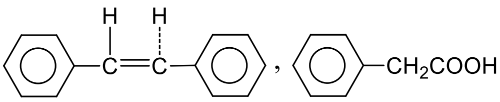
676. Which of the following statement is correct?
   a) Benzene has a tetrahedral geometry like an alkane
   b) Benzene is aromatic while naphthalene is not
   c) Benzene and Cyclohexane are both aromatic
   d) Benzene behaves more like and alkane than an alkene

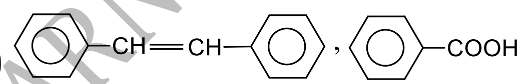
677. $CaC_2 + H_2O \rightarrow A \xrightarrow{H_2SO_4/HgSO_4} B$
   Identify A and B in the given reaction
   a) C_2H_2 and CH_3CHO
   b) CH_4 and $HCOOH$
   c) C_2H_4 and CH_3COOH
   d) C_2H_2 and CH_3COOH

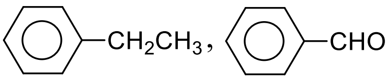
678. The correct boiling point order for corresponding hydrocarbons is:
   a) Alkyne>alkane>alkene
   b) Alkane>alkene>alkyne
   c) Alkyne>alkene>alkane
   d) Alkene>alkyne>alkane

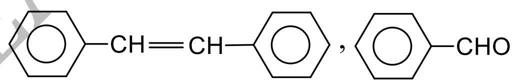
679. 

   Identify A and B

   a) 

   b) 

   c) 

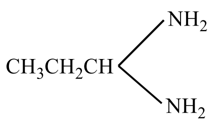
   d) 

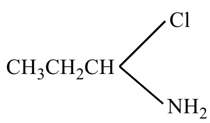
680. Electrolysis of cold concentrated aqueous solution of potassium methyl succinate yields:
   a) Ethane
   b) Ethyne
   c) Propene
   d) Ethane-1,2-diol

681. An alkene gives two moles of HCHO, one mole of CO_2 and one mole of CH_3COCHO on ozonolysis. What is its structure?
   a) $CH_2 = C = CH - CH_2 - CH_3$
   b) $CH_2 = CH - \underset{}{\overset{\displaystyle CH_3}{\overset{|}{C}H}} - CH = CH_2$
   c) $CH_2 = C = \underset{\displaystyle CH_3}{\underset{|}{C}} - CH_3$
   d) $CH_2 = C = \overset{\displaystyle CH_3}{\overset{|}{C}} - CH = CH_2$

682. Alkyl halides get converted to alkenes through:
   a) Electrophilic substitution
   b) Nucleophilic addition
   c) Elimination reaction
   d) Hydrolysis

683. In the complete combustion of C_nH_{2n+2} , the number of oxygen moles required is:
   a) $\left(\frac{n}{2}\right)O_2$
   b) $\left(\frac{n+1}{2}\right)O_2$
   c) $\left(\frac{3n+1}{2}\right)O_2$
   d) $\left(\frac{n+2}{2}\right)O_2$

684. When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$ the product formed is:
   a) $CH_3CH = CH_2$
   b) $CH_3—C\equiv CH$
   c) 

   d) 

685. Cycloalkanes are isomeric with
   a) Alkanes
   b) Alkenes
   c) Alkynes
   d) Arenes

686. Which gives only one monosubstitution product on chlorination?

a) n-pentane b) Neopentane c) Isopentane d) n-butane

687. The products obtained via oxymercuration ($HgSO_4 + H_2SO_4$)of 1-butyne would be:
a) $CH_3CH_2COCH_3$
b) $CH_3CH_2CH_2CHO$
c) $CH_3CH_2CHO + HCHO$
d) $CH_3CH_2COOH + HCOOH$

688. $\begin{matrix} R \\ R \end{matrix}\!\!>C=O$ is not converted to $\begin{matrix} R \\ R \end{matrix}\!\!>CH_2$ by:
a) Wolff-Kishner reaction b) Clemmensen reduction c) Red P+HI at 200°C d) Wurtz reaction

689. The presence of the chlorine atom on benzene ring makes the second substituent enter at a position
a) *ortho* b) *meta* c) *para* d) *ortho*/*para*

690. Two organic compounds (A) and (B) both containing only carbon and hydrogen, on quantitative analysis gave the same percentage composition by weight

$C = \left(\frac{12}{12}\right) \times 100\%,\ H = \left(\frac{1}{13}\right) \times 100\%$

A decolourises bromine water but B does not. A and B respectively are
a) C_2H_2 and C_6H_6 b) C_6H_6 and C_2H_2 c) C_2H_4 and C_2H_6 d) C_2H_2 and C_2H_6

691. Which of the following compounds react with, an aqueous solution of$Ag(NH_2)_2OH$?
a) ethane b) Ethene c) 1-butyne d) 2-butyne

692. Aromatisation of n-heptane by passing over ($Al_2O_3 + Cr_2O_3$) catalyst at 773 K gives
a) Benzene b) Toluene c) Mixture of both d) Heptylene

693. In a mixture of n-hexadecane and α-methylnaphthalene the percentage of the latter is 10.The value of cetane number is:
a) 110 b) 90 c) 10 d) Zero

694. Addition of bromine to 1,3-butadiene gives:
a) 1,2-addition product only
b) 1,4-addition product only
c) Both 1,2 and 1,4-addition products
d) No reaction

695. R— COOH $\longrightarrow$ RCH$_2$OH. This mode of reduction can be effected only by:
a) $NaBH_4$ b) Na + Alcohol c) $LiAlH_4$ d) All of these

696. A Wittig reaction with an aldehyde gives
a) Ketone compound b) A long chain fatty acid
c) Olefin compound d) Epoxide

697. Ethylene di bromide on heating with metallic sodium in ether solution yields
a) Ethene b) Ethyene c) 2-butene d) 1-butene

698. When alcoholic solution of ethylene dibromide is heated with granulated zinc, the compound formed is:
a) Ethane b) Ethylene c) Butane d) Isobutene

699. Octane number is:
a) Number of carbon atoms in octane
b) Number of molecules of octane formed in cracking of 1.0g of gasoline
c) Number of hydrogen atoms in octane
d) Number for representing standard rating of fuel

700. When an aqueous solution containing sodium acetate and sodium propionate is electrolysed we get:
a) Ethane b) Propane c) Butane d) All of these

701. Which one of the following methods is neither meant for the synthesis nor for separation of amines?

a) Curtius reaction b) Wurtz reaction c) Hofmann method d) Hinsberg method

702. *Vic*-dihalide on treatment with zinc dust gives:

a) Alkane b) Alkene c) Alkyne d) All of these

703. Identify the substitute group, that acts as *ortho* − *para* director, during electrophilic substitution in aromatic compounds.

a) $-NH_2$ b) $-NO_2$ c) $-SO_3H$ d) N_2

704. Order of acidity of H_2O, $NH_3$and acetylene is:

a) $NH_3 > CH \equiv CH > H_2O$

b) $H_2O > NH_3 > CH \equiv CH$

c) $H_2O > CH \equiv CH > NH_3$

d) $NH_3 > H_2O > CH \equiv CH$

705. $C_2H_5I + C_5H_{11}I + 2Na \xrightarrow{\text{Ether}} C_2H_5—C_5H_{11} + 2NaI$

The above equation represents:

a) Hofmann's reaction

b) Dow's reaction

c) Wurtz synthesis

d) Reimer-Tiemann's reaction

706. Identify Z in the sequence,

$CH_3 - CH_2 - CH = CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5O^- - Na^+} Z$:

a) $CH_3—CH(CH_3)—CH_2—O—CH_2—CH_3$

b) $CH_3—CH_2—CH(CH_3)—O—CH_2—CH_3$

c) $CH_3 - (CH_2)_3 - O - CH_2 - CH_3$

d) $CH_3 - (CH_2)_4 - O - CH_3$

707. Which will give cyclooctyne when treated with base?

a) 1,2-dibromocyclobutane

b) 1,1-dibromocyclobutane

c) 1,1-dibromocyclooctane

d) 1,2-dibromocyclopropane

708. The final product in 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) $CH_3 - CH_2 - CH_3$

709. What are the products obtained upon the ozonolysis of pent-2-ene?

a) CH_3CH_2CHO b) CH_3CHO c) CH_3COCH_3 d) Both (a) and (b)

710. Addition of halogen acid occurs at slowest rate in:

a) $CH_2 = CHCl$ b) $CH_2 = CH_2$ c) $CH_3— CH = CH_2$ d) $(CH_3)_2C = CH_2$

711. Benzyl chloride ($C_6H_5CH_2Cl$) can be prepared from toluene by chlorination with

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

712. The Markownikoff's rule is the best applicable to the reaction between

a) $C_2H_4 + HCl$ b) $C_3H_6 + Br_2$ c) $C_3H_6 + HBr$ d) $C_3H_8 + Cl_2$

713. Which of the following acid reacts to reverse the Markownioff's rule?

a) HCl b) HBr c) HF d) HI

714. The addition of HOCl on alkenes in presence of strong acids to form halohydrins proceeds via formation of:

a) Chloronium ion b) Carbocation c) Chloro carbocation d) None of these

715. On treatment with chlorine in presence of sunlight, toluene gives the product

a) o-chloro toluene
b) 2,5-dichloro toluene
c) p-chloro toluene
d) Benzyl chloride

716. The most oxidized form of hydrocarbon $R\text{CH}_3$ is:
a) CO_2
b) RCHO
c) RCOOH
d) RCOCOOH

717. Ethylene is used for:
a) Ripening of food
b) Preparing ethylene oxide
c) For preparing ethylene chloride
d) All are correct

HYDROCARBONS

CHEMISTRY

: ANSWER KEY :

1)	a	2)	c	3)	a	4)	d	169)	b	170)	a	171)	d	172)	a
5)	b	6)	c	7)	d	8)	c	173)	b	174)	d	175)	a	176)	a
9)	d	10)	c	11)	a	12)	a	177)	b	178)	c	179)	d	180)	d
13)	b	14)	b	15)	a	16)	b	181)	b	182)	a	183)	b	184)	b
17)	d	18)	b	19)	b	20)	d	185)	c	186)	b	187)	b	188)	b
21)	a	22)	d	23)	a	24)	a	189)	d	190)	b	191)	b	192)	a
25)	b	26)	a	27)	b	28)	c	193)	b	194)	c	195)	b	196)	a
29)	c	30)	a	31)	c	32)	c	197)	a	198)	c	199)	d	200)	d
33)	a	34)	a	35)	d	36)	d	201)	b	202)	d	203)	a	204)	b
37)	d	38)	d	39)	c	40)	c	205)	c	206)	a	207)	b	208)	b
41)	a	42)	b	43)	b	44)	a	209)	a	210)	d	211)	d	212)	a
45)	d	46)	b	47)	d	48)	a	213)	c	214)	b	215)	a	216)	c
49)	c	50)	b	51)	b	52)	b	217)	a	218)	c	219)	a	220)	b
53)	a	54)	b	55)	b	56)	a	221)	c	222)	c	223)	b	224)	c
57)	c	58)	a	59)	c	60)	a	225)	b	226)	c	227)	b	228)	b
61)	d	62)	a	63)	d	64)	a	229)	a	230)	b	231)	d	232)	b
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97)	c	98)	c	99)	c	100)	a	265)	b	266)	c	267)	d	268)	b
101)	d	102)	d	103)	c	104)	a	269)	b	270)	a	271)	d	272)	b
105)	a	106)	c	107)	d	108)	c	273)	d	274)	b	275)	b	276)	c
109)	c	110)	c	111)	d	112)	b	277)	d	278)	d	279)	a	280)	b
113)	a	114)	a	115)	b	116)	c	281)	b	282)	b	283)	b	284)	d
117)	b	118)	b	119)	b	120)	b	285)	d	286)	d	287)	b	288)	a
121)	b	122)	d	123)	c	124)	a	289)	a	290)	b	291)	d	292)	c
125)	a	126)	c	127)	c	128)	a	293)	a	294)	c	295)	a	296)	c
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161)	b	162)	a	163)	c	164)	c	329)	b	330)	d	331)	a	332)	c
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337)	d	338)	b	339)	d	340)	b
341)	b	342)	b	343)	a	344)	a
345)	d	346)	c	347)	a	348)	a
349)	c	350)	a	351)	c	352)	b
353)	b	354)	c	355)	a	356)	b
357)	c	358)	d	359)	d	360)	c
361)	c	362)	b	363)	a	364)	d
365)	a	366)	a	367)	c	368)	a
369)	b	370)	d	371)	a	372)	d
373)	c	374)	c	375)	c	376)	b
377)	a	378)	c	379)	d	380)	d
381)	b	382)	b	383)	d	384)	b
385)	d	386)	c	387)	a	388)	b
389)	a	390)	a	391)	a	392)	a
393)	c	394)	b	395)	c	396)	d
397)	a	398)	c	399)	b	400)	a
401)	b	402)	d	403)	a	404)	a
405)	d	406)	c	407)	c	408)	d
409)	b	410)	d	411)	b	412)	a
413)	c	414)	d	415)	b	416)	c
417)	b	418)	d	419)	c	420)	c
421)	c	422)	b	423)	c	424)	b
425)	a	426)	d	427)	d	428)	a
429)	a	430)	c	431)	a	432)	c
433)	b	434)	b	435)	c	436)	a
437)	a	438)	c	439)	a	440)	d
441)	c	442)	a	443)	d	444)	c
445)	a	446)	b	447)	a	448)	b
449)	b	450)	a	451)	d	452)	b
453)	d	454)	d	455)	b	456)	c
457)	c	458)	d	459)	a	460)	b
461)	c	462)	a	463)	c	464)	b
465)	c	466)	d	467)	d	468)	c
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485)	b	486)	b	487)	b	488)	a
489)	c	490)	a	491)	a	492)	c
493)	d	494)	d	495)	d	496)	a
497)	a	498)	b	499)	d	500)	c
501)	d	502)	c	503)	b	504)	d
505)	b	506)	a	507)	b	508)	b
509)	b	510)	c	511)	c	512)	a
513)	c	514)	d	515)	b	516)	b
517)	d	518)	d	519)	b	520)	a
521)	b	522)	a	523)	b	524)	d
525)	b	526)	d	527)	b	528)	d
529)	b	530)	a	531)	d	532)	b
533)	b	534)	a	535)	a	536)	b
537)	b	538)	c	539)	c	540)	a

541)	d	542)	b	543)	c	544)	d
545)	b	546)	b	547)	d	548)	d
549)	a	550)	a	551)	c	552)	d
553)	b	554)	b	555)	d	556)	d
557)	a	558)	a	559)	d	560)	a
561)	b	562)	d	563)	c	564)	a
565)	a	566)	c	567)	d	568)	a
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573)	b	574)	d	575)	c	576)	d
577)	c	578)	d	579)	b	580)	a
581)	c	582)	a	583)	b	584)	b
585)	c	586)	a	587)	c	588)	c
589)	d	590)	b	591)	b	592)	d
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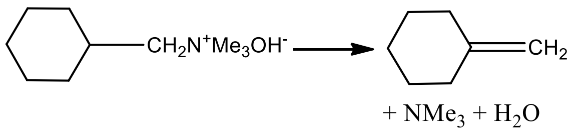
597)	d	598)	a	599)	d	600)	b
601)	a	602)	b	603)	d	604)	d
605)	d	606)	b	607)	d	608)	f
609)	a	610)	b	611)	c	612)	c
613)	d	614)	b	615)	c	616)	a
617)	c	618)	c	619)	a	620)	a
621)	a	622)	b	623)	a	624)	c
625)	c	626)	c	627)	b	628)	d
629)	a	630)	d	631)	d	632)	b
633)	d	634)	c	635)	c	636)	b
637)	a	638)	c	639)	c	640)	b
641)	a	642)	c	643)	d	644)	a
645)	a	646)	c	647)	b	648)	b
649)	a	650)	d	651)	b	652)	c
653)	c	654)	d	655)	b	656)	d
657)	f	658)	c	659)	c	660)	d
661)	a	662)	c	663)	c	664)	c
665)	c	666)	a	667)	b	668)	d
669)	b	670)	b	671)	a	672)	b
673)	c	674)	c	675)	b	676)	d
677)	a	678)	c	679)	b	680)	c
681)	d	682)	c	683)	c	684)	b
685)	b	686)	b	687)	a	688)	d
689)	d	690)	a	691)	c	692)	b
693)	b	694)	c	695)	d	696)	c
697)	c	698)	b	699)	d	700)	d
701)	b	702)	b	703)	a	704)	c
705)	c	706)	c	707)	c	708)	b
709)	d	710)	d	711)	c	712)	c
713)	b	714)	a	715)	d	716)	c
717)	d						

HYDROCARBONS

CHEMISTRY

: HINTS AND SOLUTIONS :

1 **(a)**
The formation of the alkene in an elimination reaction is called Hofmann elimination (Thermal decomposition). Elimination of hydrogen occurs from the β-carbon. So,



2 **(c)**
Bees wax is myricyl palmitate, *i.e.*, $C_{15}H_{31}COOC_{30}H_{61}$.

3 **(a)**
The knocking order is:
Straight chain alkane > branched chain alkane >olefins>arenes.

4 **(d)**
Follow peroxide effect.

5 **(b)**
Successive homologous differ by —CH_2 gp.

6 **(c)**
1, 2-dihalogen (*vicinal*) derivatives of the alkanes on reaction with zinc dust and methanol produces alkenes by loss of two halogen atoms (dehalogenation).

$$\underset{\text{1,2-dibromopropane}}{CH_3-\underset{Br}{\underset{|}{CH}}-\underset{Br}{\underset{|}{CH_2}}}+Zn \xrightarrow{\text{Alcohol}/\Delta} \underset{\text{propylene}}{CH_3CH=CH_2}$$

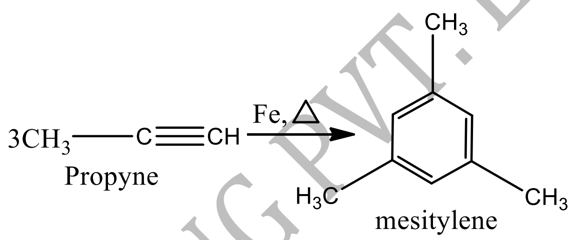
7 **(d)**
Ethylene is formed by dehydrohalogenation of alkyl halide in presence of alcoholic KOH. Ethylene decolourise alkaline $KMnO_4$ due to get oxidized by it.

$$CH_3-CH_2I \xrightarrow{\text{Alc.KOH}} \underset{\text{ethylene}}{CH_2=CH_2}$$

8 **(c)**

$$(CH_3)_2CH-C\equiv C-CH_2CH_3 \xrightarrow{[O]} (CH_3)_2CH_2COOH + CH_3CH_2COOH$$

9 **(d)**
Benzene is obtained by the polymerisation of acetylene,. Similarly, mesitylene is obtained by the polymerisation of propyne.



10 **(c)**
$C_3H_8+5O_2 \rightarrow 3CO_2+4H_2O$

11 **(a)**
Follow cleavage of two bonds at multiple bonding position during ozonolysis.

12 **(a)**
$CH_2=CH_2+CH_3COCl \xrightarrow{AlCl} CH_3COCH_2CH_2Cl.$

13 **(b)**
It is a Corey House synthesis of alkanes.

14 **(b)**
C_2H_2 is used for artificial ripening of fruits. C_2H_4 for natural ripening.

15 **(a)**
Follow Markownikoff's rule for addition.

16 **(b)**
Ethane gives a mixture of nitroethane and nitromethane.

$$\underset{\text{Ethane}}{CH_3-CH_3}+HNO_3 \xrightarrow[-H_2O]{673\text{ K}} \underset{\substack{\text{nitro ethane}\\ \text{(major)}}}{CH_3-CH_2-NO_2}+\underset{\text{(minor)}}{CH_3NO_2}$$

During nitration chain fission of alkanes also takes place, so CH_3NO_2 is also obtained along with $CH_3CH_2NO_2$.

17 **(d)**
Coal gives coal gas.

19 **(b)**
Frankland reaction: $2CH_3Br \xrightarrow{Zn} C_2H_6$.

20 **(d)**

CHCOOK $\quad\quad$ CH

$$\begin{matrix} \text{CHCOOK} \\ || \\ \text{CHCOOK} \end{matrix} \xrightarrow{\text{Electrolysis}} \begin{matrix} \text{CH} \\ ||| \\ \text{CH} \end{matrix} + 2CO_2 + 2KOH + H_2$$

cathode

Potassium maleate $\quad$ acetylene anode

21 **(a)**

F_2 reacts violently even in dark.

22 **(d)**

*e.*g., $CH_3CH_2CH = CH_2$ is unsymmetrical.
$CH_3CH = CHCH_3$ is symmetrical. Note the positions of carbon atoms on two sides of double bond.

23 **(a)**

Due to non-polar nature, alkanes are insoluble in water because water is a polar solvent.

24 **(a)**

$$\text{(a)}CH_3 - CH = CH_2 \xrightarrow{B_2H_6}$$

$$(CH_3 - CH_2 - CH_2)_3B \xrightarrow{OH^-} CH_3CH_2CH_2OH$$

Hydroboration of alkenes followed by hydrolysis in basic medium yield alcohol.

$$\text{(B)}CH_3 - CH_2 - CH_2I \xrightarrow{HI/P} \underset{\text{propane}}{CH_3 - CH_2 - CH_3}$$

Reduction of alkyl halides yield alkane.

$$\text{(c)}CH_3CH_2CH_2COONa + NaOH$$

$$\xrightarrow{CaO} \underset{\text{Propane}}{CH_3CH_2CH_3} + Na_2CO_3$$

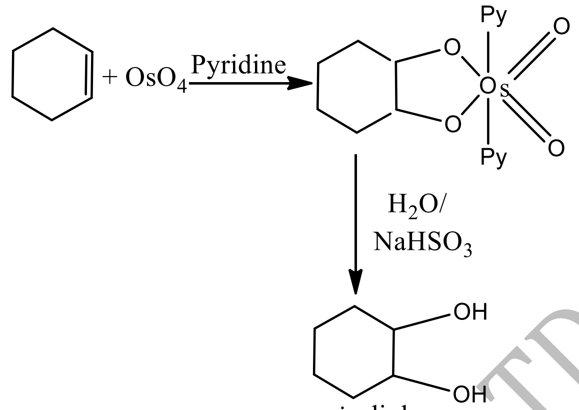
Decarboxylation of sodium salt of fatty acid yield alkane having one carbon atom less than parent acid salt.

25 **(b)**

Nitrating, mixture is conc. HNO_3 + conc. H_2SO_4.
It produces NO_2^+ electrophile which carried out electrophilic substitution reaction.

26 **(a)**

OsO_4 is a valuable oxidising agent. It oxidises alkenes to give *cis* − diols.



cis-diol

27 **(b)**

Al_4C_3 on hydrolysis gives methane gas.
$$Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$$

29 **(c)**

Vegetable oils are esters of glycerol or glycerides.

31 **(c)**

As the conjugation increases, heat of hydrogenation decreases. Thus, alkene (c) with two isolated double bonds has the highest heat of hydrogenation.

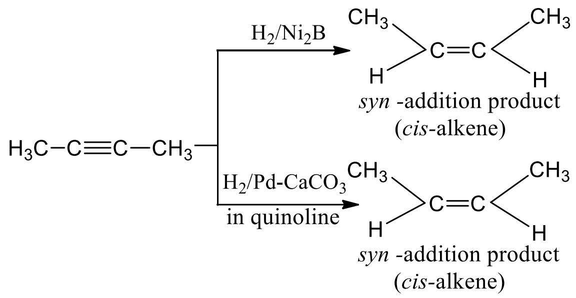
32 **(c)**

$$CH_3CH_2CH_3 \xrightarrow{400-600℃} \underset{(X)}{CH_2 = CH_2} + \underset{(Y)}{CH_4}$$

33 **(a)**

The position of the double bond in alkene is identified by ozonolysis. Bromine water is used to detect the presence of π-bond whereas ammoniacal silver nitrate $AgNO_3$ is used to detect the presence of terminal alkynes or – CHO group

34 **(a)**



While with Na/NH_3 or $LiAlH_4$, *trans* alkene is obtained, *ie*, *anti*-addition product

35 **(d)**

$$H_3C - CH_2C \equiv CH \xrightarrow[NH_4OH]{AgNO_3} CH_3CH_2C \equiv CAg$$

(1-butyne) $\quad\quad$ (silver-1 butynide)

$$H_3C - C \equiv C - CH_3 \xrightarrow[NH_4OH]{AgNO_3} \text{No reaction}$$

2-butyne

36 **(d)**

$CH_3COONa \xrightarrow{\text{Soda lime}} CH_4$

$Al_4C_3 + 12H_2O \longrightarrow 4Al(OH)_3 + 3CH_4$

$CH_3I \xrightarrow{2H} CH_4 + HI.$

37 **(d)**

Reaction of HBr with propene in the presence of peroxide gives n-propyl bromide. This addition reaction is an example of *anti*-Markownikoff's addition reaction.

($i.e.$, it is completed in form of tree radical addition.)

$CH_3 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} CH_3 - CH_2 - CH_2Br$

n-propyl bromide

38 **(d)**

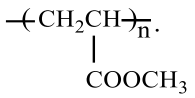
Friedel-Craft reaction proceeds *via* most stable carbocation

39 **(c)**

Follow text.

41 **(a)**

The polymer is



42 **(b)**

Symmetrical alkenes on ozonolysis give same product during ozonolysis.

43 **(b)**

C_2H_2 is commercially named narcylene.

44 **(a)**

$CH_3I + 2H \xrightarrow[\text{or } Zn-Cu/C_2H_5OH]{Zn+HCl} CH_4 + HI$

methane

$CH_3I + 2Na + ICH_3 \xrightarrow{\text{Dry ether}} CH_3 - CH_3 + 2NaI$

ethane

45 **(d)**

$CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2CO_3$

82 g CH_3COONa gives 22.4 litre CH_4.

46 **(b)**

$2CH_3I + 2Na \xrightarrow{\text{Ether}} C_2H_6 + 2NaI$

48 **(a)**

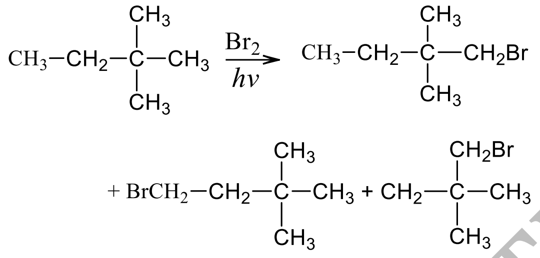
It is the name of reaction.

49 **(c)**

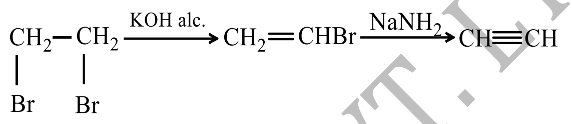
Na/Liq. NH_3or $LiAlH_4$ reduce hex-2-yne to trans-hex-2-ene.

50 **(b)**

The number of di-and poly-halogenation products depends upon (i) and the number of different types of hydrogens present in an alkane and (ii) the number of halogens introduced



51 **(b)**



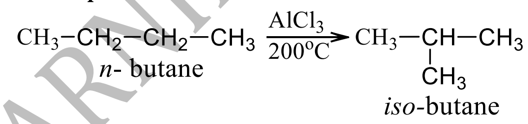
Vinyl bromide loss HBr only by strong base.

53 **(a)**

General formula of cycloalkane is C_nH_{2n}.

54 **(b)**

When alkene is passed over $AlCl_3$, isomerisation takes palce



55 **(b)**

According to Huckel's rule, the molecules which contain $(4n + 2)\pi$-electrons are aromatic.

56 **(a)**

$AgC \equiv CAg$ is white and $CuC \equiv CCu$ is red.

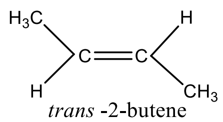
58 **(a)**

$CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$

ethyne

59 **(c)**

$CH_3 - C \equiv C - CH + 2(H) \xrightarrow[\text{liq.}NH_3]{Li}$



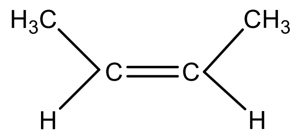
trans -2-butene

2-butyne

But in presence of Lindlar's catalyst ($Pd - CaCO_3$) 2-butyne reacts with hydrogen giving *cis*-2-butene.

$CH_3 - C \equiv C - CH + H_2 \xrightarrow{Pd-CaCO_3}$

(2-butyne)



cis -2-butene

61 **(d)**

$CH_3CH_2C \equiv CH \xrightarrow{[O]} CH_3CH_2COOH + HCOOH$

62 **(a)**

Ethane is already a saturated compound.

63 **(d)**

HIO_3 and HNO_3 both are oxidizing agent. HI is reducing agent which can reduce CH_3COCH_3 to propane,

$CH_3 - COCH_3 + 4HI \rightarrow CH_3CH_2CH_3 + H_2O + 2I_2$

64 **(a)**

We know that

$CH_3CH_2Cl + KOH \rightarrow CH_2 = CH_2 + KCl + H_2O$

Thus, in this reaction ethene (C_2H_4) is produced.

65 **(b)**

This reaction is utilized for the preparation of higher alkynes

$CH_3 - C \equiv C - H + Na \xrightarrow{Liq.NH_3} CH_3 - C \equiv C - Na$

Propyne

$CH_3 - C \equiv C - Na + BrCH_3 \rightarrow CH_3 - C \equiv C - CH_3 + NaBr$

But-2-yne

66 **(a)**

B.P. increases with increase in mol. wt.

67 **(f)**

These are common reductants.

68 **(d)**

$CH \equiv CH \xrightarrow[\text{catalyst}]{\text{Lindlar's}} CH_2 = CH_2$

Lindlar's catalyst prevents further reduction of ethane to ethane.

69 **(c)**

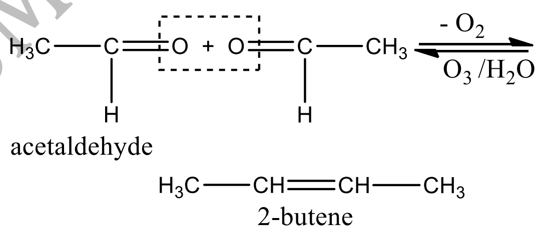
Am. Cu_2Cl_2 gives red ppt.with alkyne.

70 **(d)**

$(C_2H_5)_4NOH \xrightarrow{\Delta} (C_2H_5)_3N + C_2H_4 + H_2O$

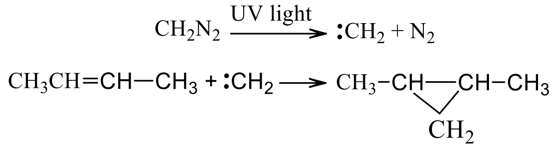
72 **(d)**

Ozonolysis involves the breaking of double bond and insertion of O atoms in place of double bond. Therefore, the structure of alkene is as



74 **(b)**

Alkenes on treatment with diazomethane (CH_2N_2) in the presence of UV light give cyclopropane and its derivatives. This addition takes place across the double bond



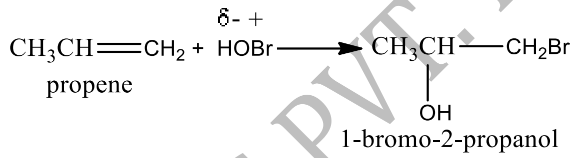
75 **(c)**

Fluorination is highly explosive and occurs violently.

76 **(b)**

$CH_3CH_2CH_2CH_2CH_2Cl$; $CH_3CH_2CH_2CHClCH_3$; $CH_3CH_2CHClCH_2CH_3$

77 **(d)**



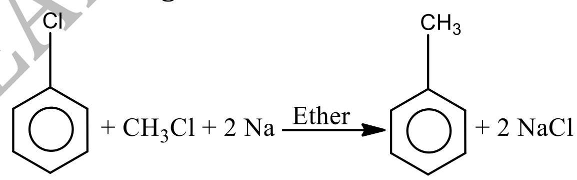
The addition takes place according to Markownikoff's rule.

78 **(c)**

$C + H_2 \xrightarrow{Arc} C_2H_2$

79 **(d)**

Wurtz-Fittig reaction

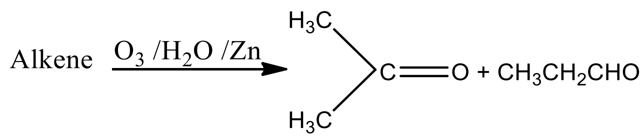


The reaction is used to yield aromatic hydrocarbons.

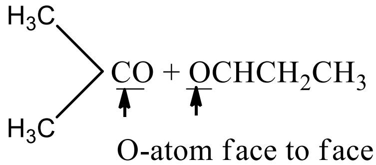
81 **(d)**

Alkanes are non-polar and have almost non-polar bonds C—H and non-polar bond C—C. They show only substitution reactions in presence of light.

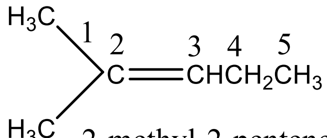
82 **(d)**



To identify alkene (from ozonolysis products)place these products with O-atoms face to face. Replace O-atoms by = (double bond).

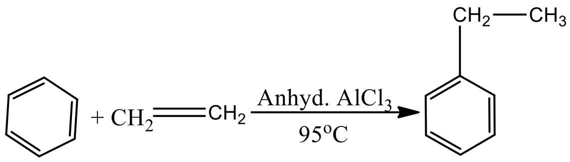


O-atom face to face



2-methyl-2-pentene

83 **(c)**
By the reaction of benzene with ethylene in presence of anhydrous $AlCl_3$, ethylbenzene is produced.



84 **(b)**
Double bond is broken to give ketone and acid.

85 **(a)**
Toluene has electron releasing group (CH_3) thus it most reactive towards electrophilic nitration

86 **(c)**
$C_nH_{2n}O = 44$
$C_nH_{2n} = 44 - 16 = 28$
$\therefore \quad n = 2$
So, $CH_3 - CH = CH - CH_3$ is symmertrical alkene.
Thus,
$CH_3 - CH = CH - CH_3 \xrightarrow[II.Zn/H_2O]{I.O_3} 2CH_3 - CH = O$
2-butene acetaldehyde

87 **(b)**
Conversion of propene to propanol is hydration.

$$CH_3 - CH = CH_2 + H_2O \xrightarrow{H_2SO_4} CH_3 - \underset{|}{\overset{OH}{CH}} - CH_3$$

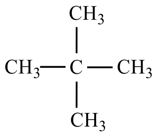
Propene propanol-2

88 **(c)**
The process is called aromatization.

89 **(c)**

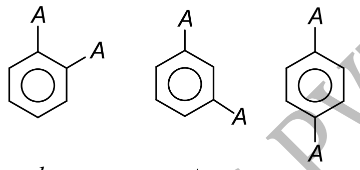
CH_4	$+ 2O_2$	$\longrightarrow CO_2$	$+ 2H_2O$
20	50	0	0
0	10	20	Liquid

90 **(c)**



is symmetrical alkane and will give only one monosubstituted product.
Is symmetrical alkane and will give only one monosubstituted product.
Also C_nH_{2n+2}, *i.e.*, $12n + 2n + 2 = 72$
$\therefore \quad n=5$

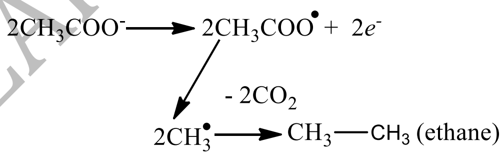
91 **(b)**
The number of disubstituted products of benzene is three



ortho- *meta-* *para-*

92 **(b)**
$R'MgX + HC \equiv CR \rightarrow R'H + RC \equiv CMgX$

93 **(a)**
$2CH_3COONa \xrightarrow{\text{Electrolysis}} 2CH_3COO^- + 2Na^+$
At anode



95 **(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 can be most readily sulphonated

96 **(b)**

$$CH_2 = CH - CH_3 + H_2O \xrightarrow{H_2SO_4} CH_2 - \underset{|}{\overset{OH}{CH}} - CH_3$$

Propylene isopropyl alcohol
Thus, in this reaction isopropyl alcohol is formed.

98 **(c)**
$CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$
$C_2H_2 + Cu_2Cl_2 \longrightarrow CuC \equiv CCu$
(Red ppt.)

100 **(a)**
According to Huckel's rule, an aromatic compound should have $(4n + 2)\pi$-electrons. Where, n is an integer, *i.e.*, 0, 1, 3, 4, … and

possesses unusual stability due to the delocalisation of π-electrons.

102 **(d)**

The octane no. for n-heptane is zero.

103 **(c)**

This is hydrogenation of alkane.

104 **(a)**

Tar, *i.e.*, pitch contains alkanes from C_{30} to C_{40} chain.

105 **(a)**

Thermal decomposition of alkanes in the absence of air is called cracking or pyrolysis *e.g.*,

$CH_4 \xrightarrow{1000°C} C + 2H_2$

106 **(c)**

The following are the necessary conditions for compound to be aromatic.

1. Molecule must be planar and cyclic.
2. Conjugated double bond must be present.
3. It must have $(4n+2)\pi$-electrons.

107 **(d)**

$CH_2 = CH—CH = CH_2$; $sp^2 - sp^2$ (C — C)bond length is 1.34 Å

1 2 3 4

108 **(c)**

$CH_2 = CH - CH_2Cl + CH_3MgI \rightarrow$

allyl chloride

$CH_2{=}CH{-}CH_2{-}CH_3 + Mg(I)(Cl)$

1-butene

109 **(c)**

(i)Among alkanes boiling point increases with increase in molecular mass.

(ii)Among isomeric alkanes the boiling point decreases with branching due to decrease in surface area.

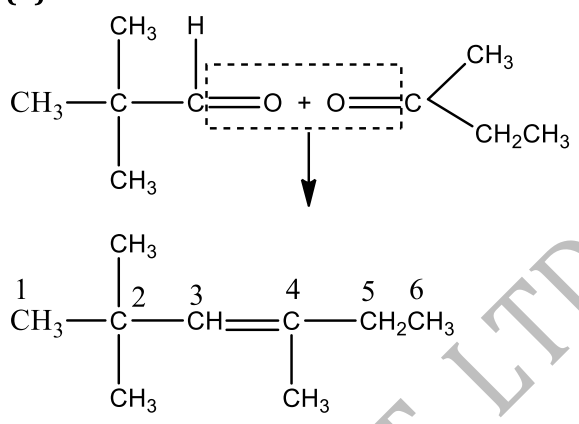
n-octane will have highest boiling point because it has highest number of carbon atoms and does not show branching.

110 **(c)**

$CH_3CH_2CH{=}CH_2 + Br_2 \longrightarrow CH_3CH_2CH(Br){-}CH_2Br$

(addition reaction).

111 **(d)**

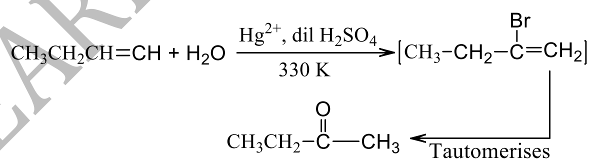


2, 2, 4 trimetyl-3-hexene

To determine alkene, place these products with O-atoms face to face and replace O-atoms by =bond.

114 **(a)**

The presence of dilH_2SO_4 and mercury salts, alkynes add a molecule of H_2O to form aldehydes or ketones



115 **(b)**

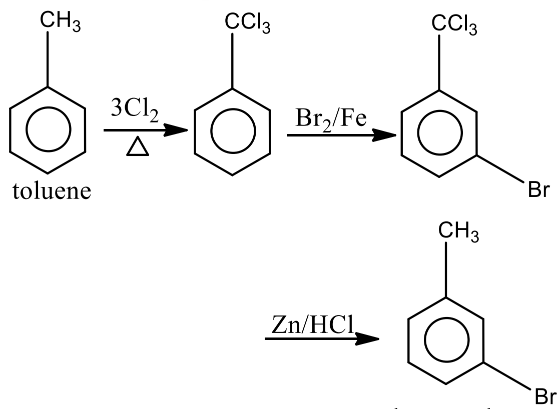
$6R—CH = CH_2 \xrightarrow{B_2H_6} 2(RCH_2CH_2)_3B_2$

$2(RCH_2CH_2)_3B_2 \xrightarrow{6H_2O_2} RCH_2CH_2OH + 2H_3BO_3$

This process always gives alkanol-1 from alkane-1.

117 **(b)**

Side chain hydrogen atoms are substituted in presence of light or heat. Ring hydrogens are substituted in presence of Lewis acid.



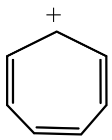
m-bromotoluene

118 **(b)**

Direct iodination of alkane is not possible because of reversible nature of HI. It is therefore carried out in presence of HgO or HIO_3.

$CH_4 + I_2 \longrightarrow CH_3I + HI$
$HgO + 2HI \rightarrow HgI_2 + H_2O$

119 **(b)**


is aromatic

is aromatic.

It contains 3 double bonds (6π electrons).
According to Huckel rule $(4n+2)\pi = 6\pi$ electrons where, $n = 1$

120 **(b)**
Since, the alkene of oxidation gives only acetic acid, therefore, the alkene must be symmetrical containing two carbon-atoms on either side of the double bond, *ie*., 2-butene.

$CH_3CH = CHCH_3 \xrightarrow{KMnO_4} 2CH_3COOH$

122 **(d)**
When carbon is bonded to four other atoms, the angle between any pair of bonds = $109°, 28'$ (tetrahedral angle) but the ring of cyclobutane is square with four angles of 90°. So, deviation of the bond angle (angle strain) in cyclobutane

$= 109°28' - 90°/2$
$= 19°28'/2$
$= 9°44'$

123 **(c)**
Excess of Cl_2 finally converts all products to CCl_4.

124 **(a)**
n-heptane gives toluene; n-octane gives ethyl benzene.

125 **(a)**
The H-atoms of terminal alkyne (*ie*., $H_3C - C \equiv CH$) is weakly acidic.

$CH_3 \equiv CH + NaNH_3 \xrightarrow{Liq.NH_3} H_3C - CH \equiv CNa + NH_3$

126 **(c)**
$HCOONa \xrightarrow{NaOH} H_2 + Na_2CO_3$

127 **(c)**
Alkyl halides undergo reduction with red phosphorus and hydrogen iodine

$CH_3CH_2CH_2I \xrightarrow[150°C]{Red\ P/HI} CH_3CH_2CH_3$

128 **(a)**
CH_4 diffuses rapidly because of low mol. wt.

129 **(a)**
Boiling point $\propto$ molecualr mass $\propto \frac{1}{branching}$

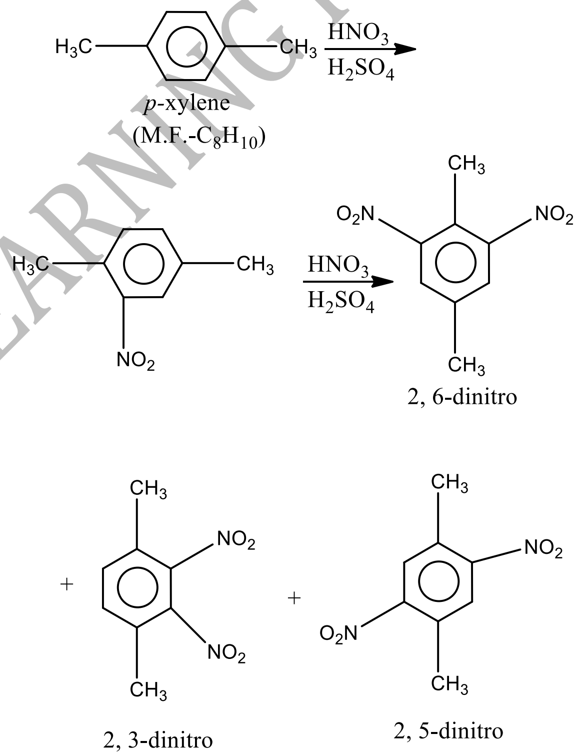
($\therefore$ surface area decreases)

$\therefore$ n-hexane has the highest boiling point among the given.

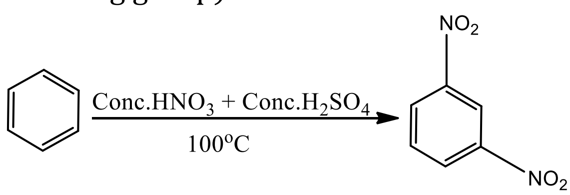
130 **(d)**
In this conformer Cl is at equatorial position and is least hindered.

131 **(c)**
Rest all are industrial uses of C_2H_2.

132 **(d)**
In p-xylene, the four nuclear H-atoms are equivalent and hence, only one on e mononitro derivative is formed. But it gives three dinitro derivatives (2,3;2,6 and 2,5) as shown below



134 **(b)**
At 60° (low temperature) mononitration occurs and nitrobenzene is obtained but at 100°C, nitrobenzene further undergoes electrophilic substitution and gives m-dinitrobenzene (as $-NO_2$ is a *meta* $-$ directing group).



m-dinitrobenzene

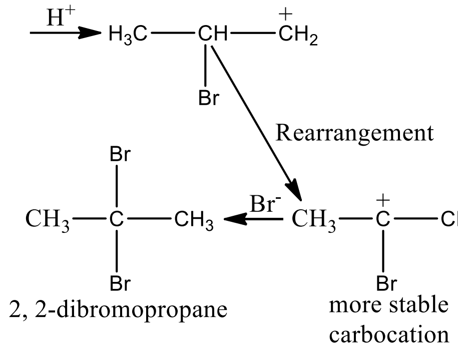
135 **(b)**
Rest all are aromatic compounds.

136 **(b)**

General formula of alkane is C_nH_{2n+2}; $2n + 2 = 10$.

137 **(a)**

$$CH_3 - C \equiv CH + HBr \rightarrow CH_3 - \underset{\displaystyle Br}{\underset{|}{C}} = CH_2$$



$$CH_3 - CH = CHBr \xrightarrow{HBr} CH_3 - CH_2 - CHBr_2$$

$$CH \equiv CH \xrightarrow{2HBr} CH_3CHBr_2$$

$$CH_3 - CH = CH_2 \xrightarrow{HBr} CH_3 - CHBr - CH_3$$

138 **(b)**

$CH_2 = CH_2 + HCl \longrightarrow CH_3CH_2Cl$ (addition reaction).

140 **(d)**

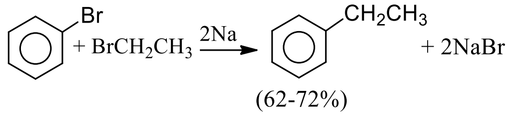
Primary alcohols are oxidized to aldehydes and then to acid to decolourise $KMnO_4$. Also ethylene oxidizes to formic acid.

141 **(b)**

Propyne gives white ppt. with ammoniacal $AgNO_3$.

144 **(a)**

Homologues of benzene may be prepared by warming an ethereal solution of an alkyl or aryl halide with sodium

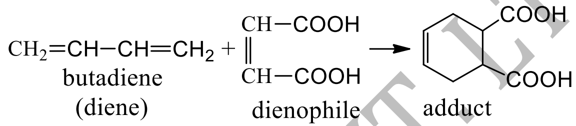


145 **(d)**

These are characteristics of ozonolysis.

146 **(a)**

When a conjugated diene (diene) is heated with an unsaturated compound (dienophile) in a sealed tube, an addition product (adduct) is obtain. This reaction is called Diel's Alder reaction



148 **(b)**

Unsymmetric alkene and HBr are primary conditions for Kharasch effect.

149 **(a)**

$$\underset{(A)}{H_2C = CH_2} \xrightarrow{HBr} CH_3CH_2Br$$

$$\xrightarrow[\Delta]{\text{Alc.KOH}} \underset{(A)}{H_2C = CH_2}$$

Hence, $A = C_2H_4$; $B = \text{alc. KOH}/\Delta$

150 **(a)**

The first addition will occur on double bond. Thus, $CH \equiv CH— CH_2— CH = CH_2 \xrightarrow{HBr} CH \equiv C— CH_2— CHBr— CH_3$ but in $CH \equiv C— CH = CH_2$, the addition will occur at $CH \equiv C$ because the product formed is conjugated alkadiene, which is more stable.

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

151 **(b)**

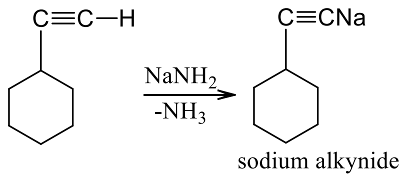
It is alicyclic or aliphatic unsaturated.

152 **(a)**

$(C_2H_5)_4$ Pb on addition to gasoline increases its octane no. by about 5 units.

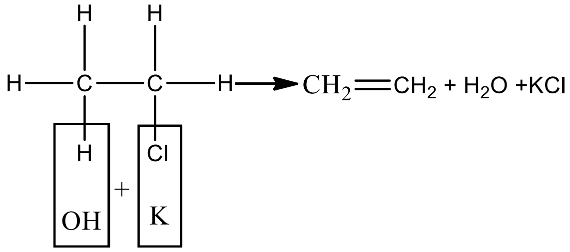
153 **(b)**

On heating with sodamide($NaNH_2$ in liq. NH_3),alkynide is formed



154 **(c)**

Only alcoholic KOH gives dehydrohalogenation reaction. Ethyl chloride reacts with alcoholic KOH as



156 **(d)**

$$\begin{array}{l}CH_3CH_2CH-CH_3\\ \qquad\qquad\;|\\ \qquad\qquad OH\end{array}$$

$$\xrightarrow{H^+} \begin{array}{c}CH_3-CH_2-CH-CH_3\\ |\\ H-O^+-H\end{array} \xrightarrow{-H_2O}$$

(Major)$CH_3CH=CHCH_3$

(Minor)$CH_3CH_2CH=CH_2$

157 **(d)**

It is fact. Follow octane number.

158 **(a)**

$$\begin{array}{l}CH_3C=CH_3\\ \quad\;|\\ \quad CH_3\end{array} \xrightarrow[\Delta]{KMnO_4} CH_3COCH_3+CH_3COOH$$

159 **(a)**

1-Butyne reacts with $NaNH_2$ to give sodium salt while 2-butyne does not react. Only terminal alkynes are acidic.

$CH_3—CH_2—C\equiv C—H \xrightarrow{NaNH_2}$ No reaction

$NH_3+CH_3—CH_2—C\equiv C^{\ominus}Na^{\oplus}$

160 **(c)**

When an alkyl halide reacts with sodium in presence of dry ether, an alkane with the double number of carbon atoms than the parent halide, is obtained and this reaction is known as Wurtz reaction.

$$\begin{array}{l}4\qquad 3\qquad 2\\ CH_3-CH-CH-Cl\\ \qquad\;|\qquad\;|\\ \qquad CH_3\;\; CH_3\end{array}$$

2-chloro-3-methyl butane

$$\begin{array}{c}\quad 3\qquad 2\\ +CH_3-CH-CH-Cl\\ \qquad|\qquad|\\ \qquad CH_3\;\; CH_3\end{array} \xrightarrow[\substack{\text{Dry ether}\\ -2NaCl}]{Na}$$

$$\begin{array}{l}6\qquad 5\qquad 4\qquad 3\qquad 2\qquad 1\\ CH_3-CH-CH-CH-CH-CH_3\\ \qquad\;|\qquad\;|\qquad\;|\qquad\;|\\ \qquad CH_3\;\; CH_3\;\; CH_3\;\; CH_3\end{array}$$

2,3,4,5-tetramethyl hexane

161 **(b)**

$$CH_3CH_2C\equiv CH \xrightarrow[\Delta]{Na/Liq.NH_3} CH_3CH_2C\equiv CNa^+$$

Considering the options given it appears correct. Na/liq. NH_3 is known for metal dissolved reduction. Actually it is truth that Na/liq. NH_3 reduces internal triple bond and terminal double bond and do not reduce the terminal alkyne due to such alkylide formation.

162 **(a)**

Homologous may or may not be straight chain compounds.

163 **(c)**

Ammoniacal cuprous chloride will give red precipitate with 1-alkynes (terminal alkynes).

$CH_3-C\equiv CH+2[Cu(NH_3)_2]Cl\rightarrow$

$CH_3-C\equiv C-Cu+2NH_4Cl+2NH_3$

(red ppt.)

165 **(c)**

C—C bond involves $2sp^3-2sp^3(\sigma)$ whereas, C—H bond involves $2sp^3-1s(\sigma)$ in alkanes.

166 **(c)**

$$CH_4+H_2O\xrightarrow{Ni/Al_2O_3}CO+3H_2$$

167 **(c)**

Terminal alkyne reacts with ammoniacalAgNO$_3$ solution give a whilteppt, therefore x must be a terminal alkyne. Thus, x must be$(CH_3)_2CHC\equiv CH$

$$(CH_3)_2CHC\equiv CH\xrightarrow{KMnO_4}(CH_3)_2CHCOOH+[HCOOH]$$

168 **(c)**

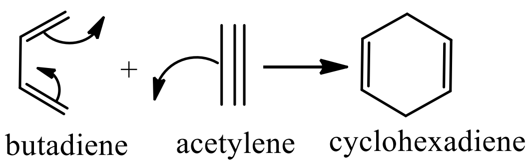
$$RCH=CR_1R_2+O_3\xrightarrow[H_2O]{Zn}RCHO+R_1COR_2$$

170 **(a)**

$$CH_2Br—CH_2Br\xrightarrow{Zn}CH_2=CH_2+ZnBr_2$$

171 **(d)**

An alkyne combine with a conjugated diene to give an unconjugated cycloalkadiene. This reaction is known as **Diels-Alder reaction.**



172 **(a)**

Now-a-days used in refineries.

173 **(b)**

Kerosene contains alkanes from C_{12} to C_{16}.

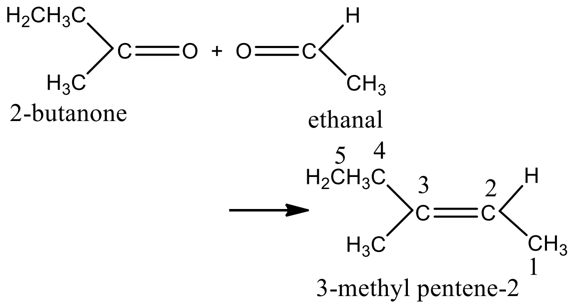
174 **(d)**

On treatment with alcoholic KOH, 1-chlorobutane gives 1-butene while 2-chlorobutane gives 2-butene (major) +1-butene (minor). Therefore, a mixture of 1-butene +2-butene is formed.

176 **(a)**

$$X \xrightarrow[\text{(ii)Zn/AcOH}]{\text{(i)}O_3} \underset{\text{Aldehyde}}{C_2H_4O} + \underset{\text{2-butanone}}{CH_3CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - CH_3}$$

The aldehyde should be CH_3CHO because the molecular formula is C_2H_4O.



177 **(b)**

Octane no. for iso-octane has been arbitrarily assumed to be 100 and for n-heptane as zero.

178 **(c)**

$CH_3CH_2CH = CH_2 \xrightarrow{\text{HBr}} CH_3CH_2CHBrCH_3$

179 **(d)**

In cyclopropane the angle strain is maximum. Hence, it is highly strained molecule and consequently most unstable. The angle strain in cyclobutane is less than cyclopropane. Hence, cyclobutane is more stable. This stability increases up to 6 membered rings then decreases from 7 to 11 membered rings and from the 12 membered rings onwards attains the stability of 6 membered ring. Heat of combustion is a method of measuring chemical stability. Hence, cyclohexane has the lowest heat of combustion.

180 **(d)**

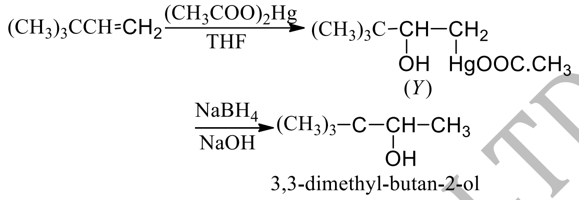
At 70–120°C gasoline, at 150–250°C kerosene; at 250–400°C diesel oil.

181 **(b)**

Triple bond is shifted from centre to corner.

183 **(b)**

Oxymercuration-demercuration is an example of hydration of alkene according to Markownikoff's rule

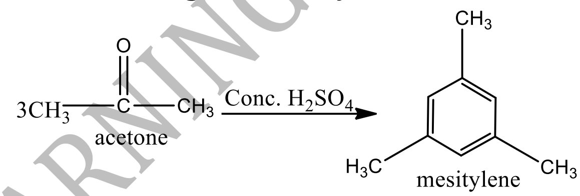


184 **(b)**

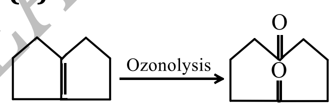
Cetane number of hexadecane is 100 and of methyl naphthalene is zero.

185 **(c)**

Distillation of acetone with concentrated conc. H_2SO_4 gives mesitylene.



186 **(b)**



See rupture of C=C to convert it to C=O.

187 **(b)**

Soda lime (NaOH + CaO) is used to slow down the decarboxylation otherwise the reaction will occur violently.

188 **(b)**

More is the amount of CO in exhaust fuel, more incomplete is combustion of fuel.

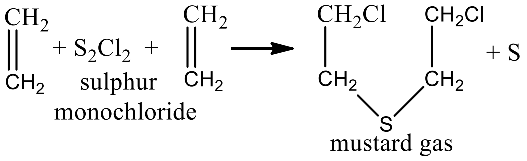
189 **(d)**

It may be $CH_3CH_2C \equiv CH$ or $CH_2 = CH—CH = CH_2$ or

$CH_3HC = CH—CH_3$.

190 **(b)**

Mustard gas is β, β-dichlorodethylsulphide which is prepared by the action of sulphur monochloride on ethylene.



mustard gas

β, β'-dichlorodiethyl sulphide

191 **(b)**

$CH \equiv CH + CH_3OH \xrightarrow{CH_3ONa} CH_2 = CH.OCH_3$ is nucleophilic addition.

192 **(a)**

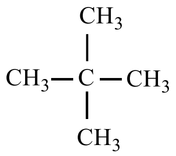
CH_4obtained in (c) is contaminated with C_2H_2, C_2H_4 and H_2.

193 **(b)**

Larger is surface area, more is viscosity. Surface area decreases with increase in branching.

196 **(a)**

C_5H_{12}has molecular mass = 72



will give only one mono substituted product.

197 **(a)**

(i)Electron rich groups are o, p directing .,

$-OH, -Br, -CH_3$ etc.

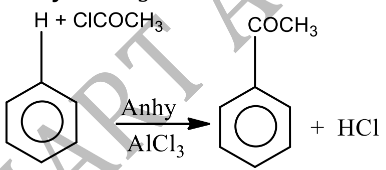
(ii)Electron deficient groups having multiple bonds are m-directing.

$eg.$, $-COOH, -NO_2$

198 **(c)**

In the given compounds only acetophenone is prepared by substitution. Other compounds are prepared by addition reactions.

Acetophenone is prepared when benzene reacts with acetyl chloride in presence of anhy. $AlCl_3$ as



acetophenone

200 **(d)**

$CH_2 = CH - CH_2CH_3$

Butene-1

$\xrightarrow[\Delta,\text{pressure}]{Pd/H_2} CH_3 - CH_2 - CH_2 - CH_3$

butane

Other reagents are successful with polar double bonds.

203 **(a)**

$$Ph - C \equiv C - CH_3 \xrightarrow{Hg^{2+}/H^+} Ph - \underset{\underset{OH}{|}}{C} = CH - CH_3$$

$$\underset{(A)}{Ph - \underset{\underset{O}{||}}{C} = CH_2CH_3}$$

204 **(b)**

Follow mechanism of Wurtz reaction.

205 **(c)**

It is a non-terminal alkyne.

207 **(b)**

1, 2-bromo cyclopentane on heating with 1^- in acetone gives cyclopentene.

208 **(b)**

Terminal alkynes react with am. $AgNO_3$ or $Ag(NH_3)_2^+OH^-$to give white ppt.

209 **(a)**

The reactivity order of 1°, 2° and 3° H-atoms has been explained in terms of hyper conjugation.

210 **(d)**

$$\underset{\text{1-butyne}}{CH_3CH_2C \equiv CH} + H_2O \xrightarrow{HgSO_4/H_2SO_4}$$

$$CH_3CH_2\overset{\overset{OH}{|}}{C} = CH_2 \xrightarrow{H_2O} \underset{\text{unstable}}{CH_3CH_2 - \underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{C}} - CH_3}$$

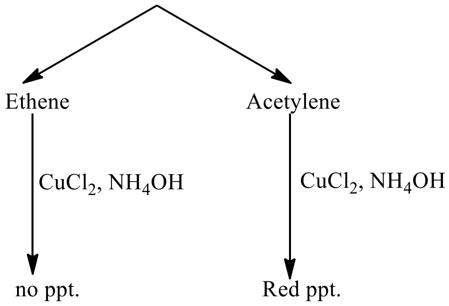
$$\xrightarrow{-H_2O} \underset{\text{butan-2-one}}{CH_3CH_2 - \underset{\underset{O}{||}}{C} - CH_3}$$

212 **(a)**

The reactivity order is, $Cl_2 > Br_2 > I_2$.

213 **(c)**

Decolourisation of $KMnO_4$ (unsaturation test)



214 **(b)**

Indane is commercial name of L.P.G.

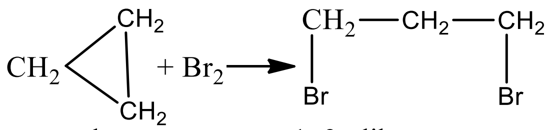
215 **(a)**

Terminal alkynes react with ammoniacal $AgNO_3$ to give silver salt as they have acidic hydrogen.

$CH_3 - C \equiv CH + AgNO_3 + NH_4OH \rightarrow$
$CH_3 - C \equiv C.Ag + NH_4NO_3 + H_2O$

217 **(a)**

Cyclo propane is the most unstable cyclic compound. So, with bromine it gives an open chain compound 1, 3-dibromopropane.



cyclopropane 1, 3, dibromo propane

218 **(c)**

Addition of HBr to an alkene in the presence of peroxide is the example of free radical addition reaction

$$R-O-O-R \longrightarrow 2R-\dot{O}$$
$$R-\dot{O} + HBr \longrightarrow R-OH + Br^\bullet$$
$$R-CH=CH_2 + Br^\bullet \longrightarrow CH_3-\dot{C}H-CH_2Br$$
$$CH_3-\dot{C}H-CH_2Br \xrightarrow{HBr} CH_3CH_2CH_2Br + Br$$
$$Br^\bullet + Br^\bullet \longrightarrow Br_2$$

219 **(a)**

All H-atoms in *neo*-pentane are equivalent thus, it will yield monochloro product

220 **(b)**

Acetylenichydrogens are acidic because sigma electron density of C − H bond in acetylene is nearer to carbon, which has 50% *s*-character

221 **(c)**

Follow text.

222 **(c)**

Wurtz reaction Alkyl halide reacts with sodium in presence of dry ether forms alkane is known as Wurtz reaction.

$CH_3Br + 2Na + BrCH_3$
$\xrightarrow{\text{Ether}} CH_3 - CH_3 + 2NaBr$

223 **(b)**

It is an experimental fact.

224 **(c)**

(i)Unsaturated hydrocarbons are more reactive than saturated hydrocarbons.
(ii)Among alkene and alkyne, alkene are more reactive because C ≡ C is quite strong bond.

∴ Correct order of reactivity

Alkene>alkyne>alkane

or $C_2H_4 > C_2H_2 > C_2H_6$
ethene ethyne ethane

225 **(b)**

$(C_6H_{10}O_5)_n + nH_2O \xrightarrow{\text{Bacteria}} 3nCH_4 + 3nCO_2$

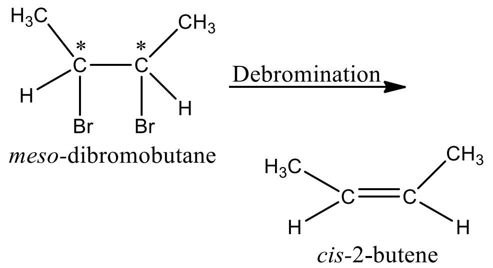
226 **(c)**

It is a common method to prepare alkanes. Methane cannot be prepared by Wurtz reaction.

$CH_3Br + 2Na + BrCH_3 \rightarrow C_2H_6 + 2NaBr$
ethane

227 **(b)**

Symmetrical optical isomers are called mesomers.



228 **(b)**

$CH \equiv CH + HBr \rightarrow CH_2 = CHBr$

229 **(a)**

$CH_3CH_2COONa \xrightarrow{\text{Electrolysis}} CH_3(CH_2)_4CH_3 + NaOH + H_2$

230 **(b)**

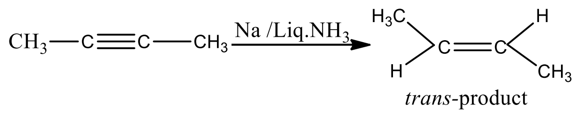
$2CHCl_3 + 6Ag \longrightarrow C_2H_2 + 6AgCl$

231 **(d)**

In the presence of ferric chloride, electrophilic substitution at *ortho* and *para* position take place

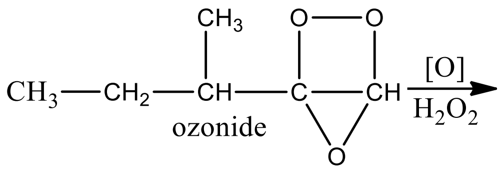
232 **(b)**

Butyne reacts with Na/liq. NH_3 to give *trans*-product.



233 **(c)**

$$\underset{\text{3-methyl-1-pentyne}}{CH_3-CH_2-\underset{|}{\overset{CH_3}{CH}}-C\equiv CH} \xrightarrow[+O_3]{+NaNH_2}$$



$$CH_3-\overset{\overset{CH_3}{|}}{CH}-CH-COOH+HCOOH$$

Optically active carboxylic acid.

236 **(a)**

The mechanism of Wurtz reaction is:

$C_2H_5Br+Na \longrightarrow \dot{C}_2H_5+NaBr$

$\dot{C}_2H_5+\dot{C}_2H_5 \longrightarrow C_4H_{10}$

The disproportionation of free radical gives

$\dot{C}_2H_5+\dot{C}_2H_5 \longrightarrow C_2H_4$

237 **(b)**

When sodium propionate is heated with sodalime, ethane is formed.

$$CH_3CH_2COONa+NaOH \xrightarrow{CaO} \underset{\text{ethane}}{C_2H_6}+Na_2CO_3$$

238 **(c)**

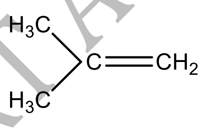
$2CH_3-CHBr+2Na \xrightarrow{\text{Dry ether}} CH_3-CH-CH-CH_3$

$\quad\; |\qquad\qquad\qquad\qquad\qquad |\quad\; |$

$\quad CH_3\qquad\qquad\qquad\qquad CH_3\;\; CH_3$

Isopropyl bromide $\qquad$ 2,3-dimethyl butane

239 **(d)**

Isobutene  has minimum force of attraction (due to steric hindrance). Thus, minimum boiling point.

240 **(d)**

$CH_4+X_2 \longrightarrow CH_3X+CH_2X_2+CHX_3+CX_4$,

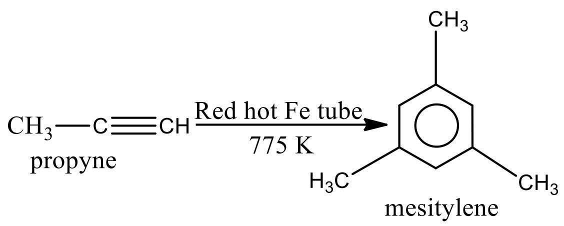
Also combination of $\dot{C}H_3$ free radical may give C_2H_6. The free radicals formed are $\dot{C}l$, $\dot{C}H_3$,$\dot{C}H_2Cl$,$\dot{C}HCl_2$ and $\dot{C}Cl_3$.

242 **(b)**

$CH\equiv C.Na+CO_2 \longrightarrow CH\equiv C.COONa$

243 **(a)**

Propyne on passing through red hot iron tube gives mesitylene



244 **(c)**

$\underset{\text{Grignard reagent}}{(CH_3)_3C-MgCl}+D.OD$

$\rightarrow (CH_3)_3C.D+MgCl(OD)$

[Grignard reagent when reacts with a protic solvent, gives alkane].

245 **(a)**

These are arbitrarily assigned values.

246 **(d)**

Acetylene does not react withNaOH.

247 **(d)**

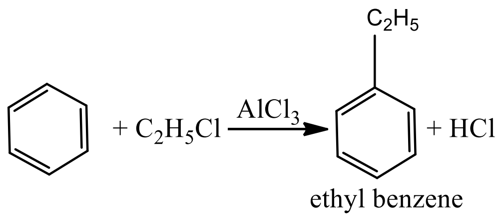
82 g CH_3COONa gives 22.4 litre CH_4.

248 **(d)**

Non-terminal alkynes do not have acidic H-atom.

249 **(a)**

In presence of a Lewis acid (like $AlCl_3$), benzene gives electrophilic substitution reaction with alkyle halide. This is called Friedel-Craft's alkylation.



250 **(a)**

$$CH_2Br-CBr=CH_2 \xrightarrow[\text{Alcohol}]{\text{Zn dust}} CH_2=C=CH_2+ZnBr_2$$

This is dehalogenation.

251 **(d)**

ω -dihalides when reacts with sodium metal, gives cyclic hydrocarbons. This is an example of intramolecular Wurtz reaction.

$$\underset{Br}{\underset{|}{CH_2}}-CH_2CH_2-\underset{Br}{\underset{|}{CH_2}} \xrightarrow[-2NaBr]{Na} \text{cyclobutane}$$

252 **(d)**

Rest all are detained by it.

255 **(a)**

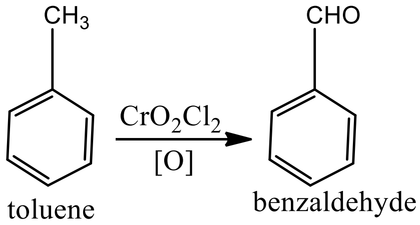
Due to more close packing, even carbon atom alkanes have higher value.

258 **(b)**

Product will be spiropentane.

260 **(a)**

Toluene is oxidised to benzaldehyde in presence of chromyl chloride. This reaction is called Etard's reaction.



262 **(a)**

Markownikoff's addition the negative part of the unsymmetrical reagents adds to a less hydrogenated (more substituted) carbon atom of the double bond. In ICl, Cl is more electronegative. So, it will take negative charge, . *e*., I^+Cl^-. So, the product is

$$RCH_2CH{=}CH_2 + \overset{+}{I}\overset{-}{Cl} \longrightarrow R{-}CH_2{-}\underset{\displaystyle Cl}{\underset{|}{CH}}{-}CH_2I$$

263 **(b)**

Reduction of CH_3COCH_3 with HI and red P will give propane

264 **(a)**

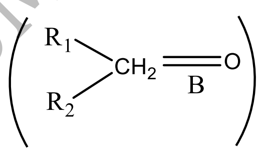
Acetylene is acidic and thus reacts with $NaNH_2$. Na. Amm. $AgNO_3$ reduces itself on reacting with acetylene with HCl it gives addition reactions. However, being weak it does not react with NaOH.

265 **(b)**

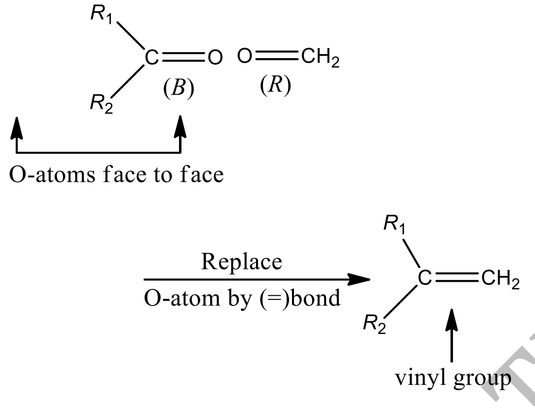
Alkenes give carbonyl compounds on ozonolysis

Alkene $\xrightarrow{O_3/Zn/H_2O}$ HCHO + other carbonyl compound

(A)



To determine alkene, place carbonyl compounds with their O-atom face to face. Replace O-atom by a double bond



266 **(c)**

An increase in molecular weight results in an increase in van der Waals' forces of attractions which results in an increase in b.p.

268 **(b)**

$CH_2 = CH_2 \xrightarrow{H_2O} CH_3.CH_2OH$

269 **(b)**

LPG is a mixture of lower alkanes mainly isobutene and butane.

271 **(d)**

Reducing agent P + HI gives alkane in every case.

272 **(b)**

Lewisite is

$\underset{\displaystyle Cl}{\underset{|}{CH}}{=}CHAsCl_2$ formed by the action of

$AsCl_3$ on $CH \equiv CH$

275 **(b)**

Follow Saytzeff's rule for elimination.

276 **(c)**

Any aliphatic carbon with hydrogen attached to it, in combination with benzene ring, will be oxidised to benzoic acid by $KMnO_4/H^+$.

277 **(d)**

$CH_4 + HNO_3 \xrightarrow{\Delta} CH_3NO_2$; nitration reaction.

278 **(d)**

Terminal alkynes give red. Ppt. with amm. Cu_2Cl_2.

279 **(a)**

An isolated alkadiene has double bonds, one at each corner.

281 **(b)**

Na will react with —OH group

283 **(b)**

PhMgBr can be protonated by any of the protic solvent *e.g.*, CH_3OH.

$$PhMgBr + CH_3OH \longrightarrow \underset{\text{benzene}}{Ph{-}H} + Mg\begin{matrix} Br \\ OCH_3 \end{matrix}$$

284 **(d)**

Addition of iso-octane to gasoline increases octane number of fuel or decreases knocking.

285 **(d)**
Because of less density cyclo hexane floats over water.

286 **(d)**
$CH_2 = CH_2 + H_2O + [O]$
$\xrightarrow{\text{Baeyer's reagent}} CH_2OH.CH_2OH$

287 **(b)**
The reduction of >C=C< only to >CH—CH< is influenced by H_2/catalyst.

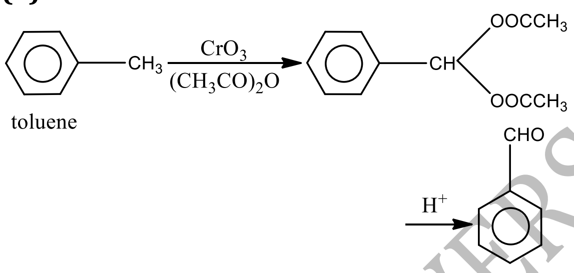
289 **(a)**
Except NaOH rest all reacts with C_2H_2.

290 **(b)**
Catalytic hydrogenation is free radical addition. Also more is heat of hydrogenation ($\Delta H = -\text{ve}$) more is reactivity for alkene for hydrogenation.

291 **(d)**
It is simply called addition of halogen.

292 **(c)**
$CO + 3H_2$, is called synthetic gas.

293 **(a)**



benzaldehyde

294 **(c)**
Alkaline $KMnO_4$ converts an H-atom to —OH gp.

295 **(a)**
*Gem*dihalides on treatment with alcoholic KOH give alkyne.

$CH_3-CH\langle^{X}_{X} \xrightarrow{\text{alc. KOH}} HC\equiv CH + 2HX$
ethyne

296 **(c)**
Ag^+ ion increases the solubility of alkenes due to the formation of $p\pi - d\pi$ bonding.

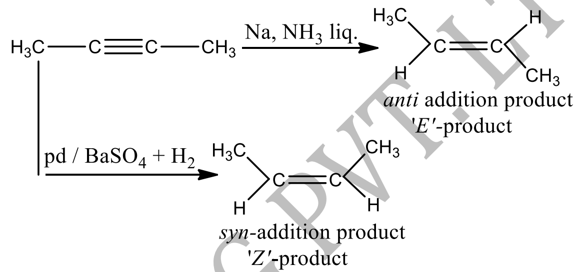
297 **(c)**
$CH \equiv CH + 2HCHO \rightarrow HOH_2C - C \equiv C - CH_2OH$
Acetylene 2, butyne-1, 4-diol

298 **(b)**
$(CH_3)_2CHCOONa \xrightarrow{\text{NaOH+CaO}} (CH_3)_2CH_2 + Na_2CO_3$

299 **(a)**
Alkenes show electrophilic addition.

301 **(c)**
Methane cannot be produced by Wurtz reaction, Kolbe's electrolytic method and reduction with H_2because, it has one carbon atom.
Pure methane can be produced by the decarboxylation of sodium acetate.
$CH_3COONa + NaOH \xrightarrow{\text{CaO}} CH_4 + Na_2CO_3$
Soda lime methane

302 **(a)**



Hence, reagent $X$and $Y$are respectively Na, NH_3 and $Pd/BaSO_4 + H_2$.

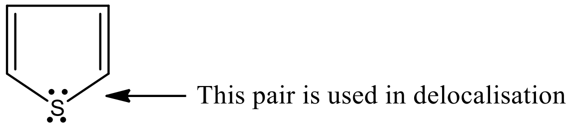
303 **(d)**
When methane is oxidised in presence of molybdenum oxide (MoO), it gives methanal (formaldehyde).
$CH_4 + 2[O] \xrightarrow{[MoO]} HCHO + H_2O$
formaldehyde

304 **(d)**
Propyne reacts with $AgNO_3$ in NH_3 to give while ppt. of silver acetylide and propene does not react with it. (Only terminal alkynes react with$AgNO_3$ in NH_3).
$CH_3 - C \equiv CH + AgNO_3 + NH_3$
Propyne
$\rightarrow CH_3 - C \equiv C\ Ag$
silver acetylide
(white ppt.)
$CH_3 - CH = CH_2 + AgNO_3 + NH_3 \rightarrow$
no reaction

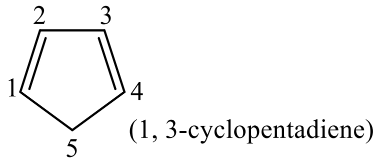
305 **(a)**
Rotation of groups or atoms round single bond produces conformation.

306 **(a)**
A compound is said to have aromatic character if ring system is planar (with p-orbital) and there is complete delocalisation of π-electrons (lone pair may be taken for delocalisation as relay electrons). This is true

is conjugated cyclic system.



Huckel rule is followed by when electrons used in delocalisation=$(4\pi + 2)$
(including lone-pair)
Where, n=0, 1, 2, 3,....



4. ring is planar

5. ring is not conjugated

6. delocalisation of π-electrons is not possible after C_4.

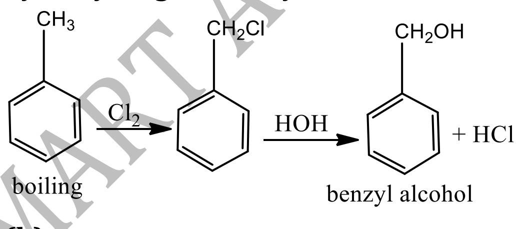
7. $(4\pi + 2)\pi$-electrons=4

Hence, it is not aromatic.

307 **(b)**
Kerosene contains C_{11}— C_{16} atoms alkanes.

308 **(a)**
The stability of alkenes increases with increase in substitution of H attached on doubly bonded carbon by alkyl groups.

309 **(d)**
When chlorine is passed in boiling toluene, substitution in side-chain takes place and benzyl chloride is obtained which on hydrolysis give benzyl alcohol.



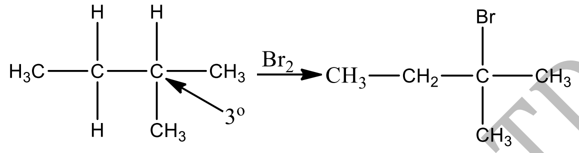
310 **(b)**
To oxidize HI formed during the reaction; otherwise the strong reducing nature of HI will reverse the iodination.

312 **(c)**
Reactivity of alkenes decreases with increase in no. of carbon atoms in alkene as well as substitution of H-atom attached to double bond.

313 **(c)**

$CH_3C \equiv CH \xrightarrow{SeO_2} CH_3COCHO$

314 **(c)**
3° (C − H) bond has minimum bond energy hence easily cleaved giving 2 bromo 2-methyl butane



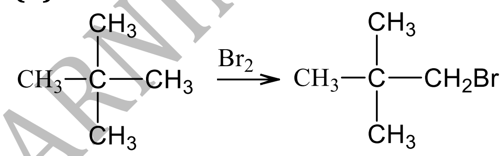
315 **(a)**

$(CH_3)_3CCH = CH_2 \xrightarrow{Hg(OOC.CH_3)_2}$

$\underset{\underset{OOCCH_3}{|}}{(CH_3)_3CCHCH_2HgOOCCH_3} \xrightarrow[NaOH]{NaBH_4} (CH_3)_3CCHOHCH_3$

316 **(d)**
These are facts about alkanes.

318 **(b)**



Only primary hydrogen atoms are present here, thus only one product is formed

319 **(d)**
The phenomenon of decomposition of higher alkanes into lower hydrocarbons on heating in absence of air is called cracking.

320 **(a)**
Ethyl benzene cannot be prepared by Wurtz reaction. This method is suitable for the preparation of symmetrical alkanes.

321 **(a)**

$AgC \equiv CAg \xrightarrow{HCl} CH \equiv CH$

322 **(a)**

$Cl_3 - C - CH = CH_2 \xrightarrow[\text{anti-Markownikoff rule}]{HCl} Cl_3 - C - CH_2 - CH_2Cl$

($\because$ $CCl_3$is highly electron attracting group)

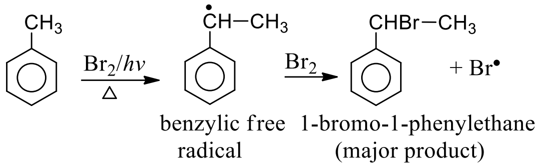
323 **(b)**
KOH alc., $NaNH_2$ and C_2H_5ONa are used for dehydrohalogenation.

324 **(b)**
Octane number represents percentage of iso-octane.

325 **(a)**
Cyclopropane is most strained alkane; follow Baeyer's strain theory.

326 **(c)**

If the side chain is larger than a methyl group, the halogenation always at the benzylic carbon



327 **(d)**

$C + H_2 \xrightarrow{\text{Arc}} C_2H_2 + C_2H_4 + C_2H_6$

Main

328 **(b)**

Propene undergoes allylic substitution at this temperature instead of addition reaction.

330 **(d)**

$C_2H_4(OH)_2$ is anti-freeze; C_2H_5Cl is solvent. C_2H_4O is fumigant.

331 **(a)**

C_6H_6 is main product of light oil fraction.

333 **(b)**

C_2H_2 is commonly used in oxy-acetylene welding.

334 **(d)**

3-octyne is obtained by the reaction of 1-bromobutane and but-1-yne in presence of sodamide.

$CH_3CH_2C \equiv CH + NaNH_2$

$\rightarrow CH_3CH_2 - C \equiv \bar{C}Na^+$

$CH_3CH_2C \equiv \bar{C}Na + BrCH_2CH_2CH_2CH_3$

$\rightarrow CH_3CH_2C \equiv C - CH_2CH_2CH_2CH_3$

3-octyne

335 **(b)**

In C_2H_5 each C-atom is *sp*-hybridised which contains 50% *s*-character. The greater the *s*-character of an orbital, the bonding electron pair will be more inclinated towards the nucleus as a result carbon would acquire a negative charge and hydrogen a positive charge. Hence, it is acidic in nature.

$H - C \equiv C : H$

sp *sp*

and removal of hydrogen as proton takes place.

336 **(a)**

Follow mechanism of addition reactions.

337 **(d)**

$CH_2 = CH - CH = CH_2$ (1,3-dibutene) is a conjugate diene because it has alternate carbon-carbon single and double bonds. It reacts with HBr. It also polymerises to form Buna-N rubber etc.

It also polymerises to form SBr.

340 **(b)**

The product of give reaction will be according to Markownikoff's rule, this is because peroxide effect is applicable only in case of HBr and not effective in case of HI.

$CH_3 - CH = CH_2 \xrightarrow[\text{peroxide}]{\text{HI}} CH_3 - \underset{\underset{I}{|}}{CH} - CH_3$

341 **(b)**

A characteristic reaction of aldehyde with Tollen's reagent. Rest all also attacks C=C.

342 **(b)**

When calcium carbide reacts with water, ethyne is formed.

$CaC_2 + 2H_2O \xrightarrow[-Ca(OH)_2]{} C_2H_2$

Calcium carbide ethyne

$\xrightarrow[\text{(ii)}H_2O/H^+]{\text{(i)}O_3} HCOOH + HCOOH$

Formic acid Formic acid

346 **(c)**

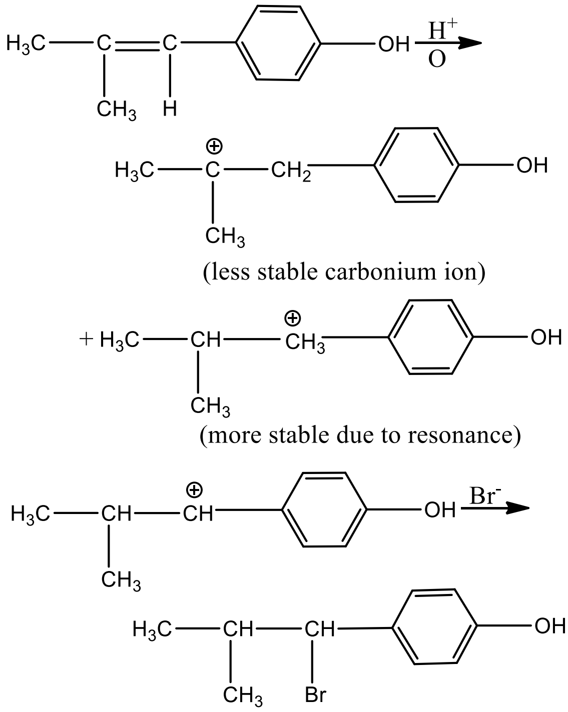
$CH_3I \xrightarrow[\text{reaction}]{\text{Wurtz}} C_2H_6$; $CH_3I \xrightarrow{\text{Reduction}} CH_4$

$CH_3COONa \xrightarrow{\text{Electrolysis}} C_2H_6$;

$CH_3COONa \xrightarrow{\text{NaOH}} CH_4$

347 **(a)**

The addition of HBr to an alkene is an example of electrophilic addition reactions. It takes place by following mechanism.

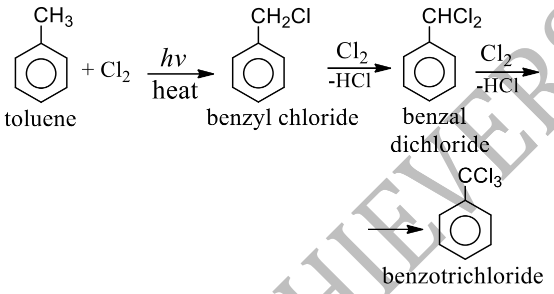


348 **(a)**

$3C_2H_6 \xrightarrow{\Delta} C_6H_6 + 3H_2$; the reaction is called aromatisation.

349 **(c)**

When toluene is heated in light with Cl_2 in the absence of halogen carrier, Benzotrichloride is obtained



351 **(c)**

$CH_2 = CHCH = CH_2 + HBr \rightarrow$

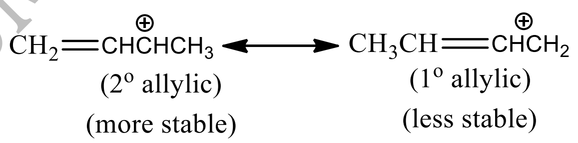
$CH_3CHCH = CH_2 + CH_3CH = CHCH_2Br$

|

Br

1,2-addition product 1,4-addition product

Addition is through the formation of allylic carbocation.

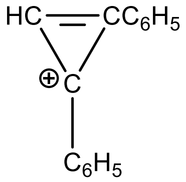


$CH_2 = CHCHCH_3 \leftrightarrow CH_3CH = CHCH_2$

Under mild conditions (temperature≈ −80°C) kinetic product is the 1, 2-addition product and under vigorous conditions (temp. ≈ 40°C) thermodynamic product is the 1,4-addition product.

Thus, 1-bromo-2-butene is the major product under given condition.

352 **(b)**



is aromatic because the compound is cyclic and number of π-electrons is 2, which is in accordance with the Huckel's rule, $(4\pi + 2)\pi$. When n=0, according to this rule, number of π-electrons is $4 \times 0 + 2 = 2$.

353 **(b)**

Ethylene reacts with 1% alkaline $KMnO_4$ gives ethylene glycol.

CH_2 CH_2OH

$|| + H_2O + O \xrightarrow[KMnO_4]{1\%\ \text{alkaline}} |$

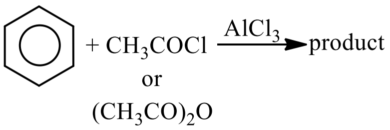
CH_2 CH_2OH

354 **(c)**

Wurtz reaction.

355 **(a)**

Friedel-Craft's acylation in this reaction benzene reacts with acetyl chloride or acetic anhydride in presence of anhy. $AlCl_3$.



The X is

$$R - \overset{\overset{\large O}{\|}}{C} - Cl$$

356 **(b)**

$CS_2 + 2H_2S \xrightarrow{Cu} CH_4 + 3S$

358 **(d)**

$CH \equiv CH + CH_3OH$

$\xrightarrow[160-200°C]{CH_3OK} CH_3O - CH = CH_2$

Ethyl vinyl ether

359 **(d)**

These are facts about addition reaction.

363 **(a)**

Fire damp is name for CH_4.

364 **(d)**

(i)Markownikoff's rule is applicable to addition of unsymmetrical alkene to unsymmetrical reagent.

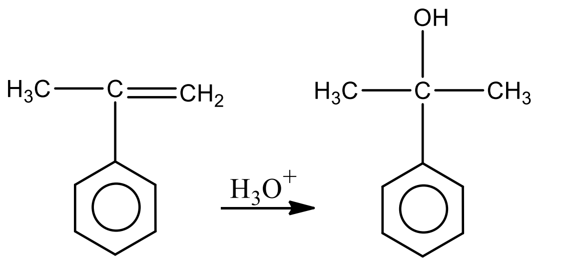
(ii)*Anti*-Markwonikoff's rule is applied to addition of HBr to unsymmetrical alkene in presence of peroxide. Free radical is the reaction intermediate during this reaction. According to this rule negative part of the reagent adds to carbon atom having more number of hydrogen atoms.

$CH_3 - CH = CH_2 \xrightarrow[\text{peroxide}]{\text{HBr}}$

$CH_3 - CH_2 - CH_2 - Br$

365 **(a)**

Acidic hydration of 2-phenyl propene follows electrophilic reaction mechanism forming an intermediate 3° carbocation (more stable), thereby forming 2-phenyl-2-propanol.



2-phenyl propene 2-phenyl-2-propanol

366 **(a)**

C_2H_4 is a monomer unit of polythene, *i.e.*, $\left(CH_2 - CH_2 \right)_n$

367 **(c)**

Halogenation of alkanes is free radical substitution.

368 **(a)**

Staggered form is more stable.

369 **(b)**

Alkene having all its H attached on double bond does not decolourise Br_2 water due to low reactivity.

370 **(d)**

R of RMgX reacts with acidic H to give alkane.

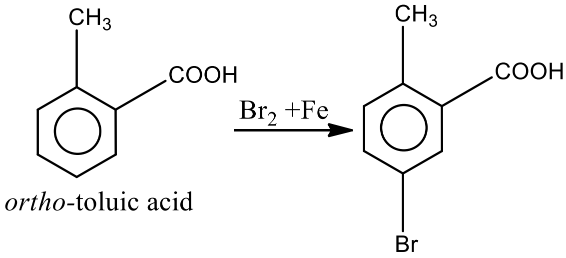
371 **(a)**

The carbon-carbon bond length in benzene (1.39 Å) in between that of C − C(1.54 Å) and C = C(1.34 Å) *i.e.*, in between that of C_2H_6 and C_2H_4.

373 **(c)**

Follow strainless ring theory.

374 **(c)**



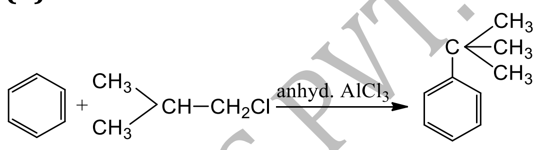
ortho-toluic acid

(∵ In the product, −Br is *para* to − CH_3 and *meta* to − COOH.)

375 **(c)**

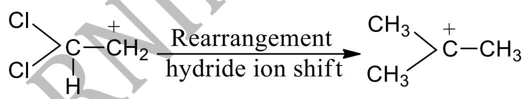
Hydrogenation of alkene or alkyne in presence of Ni is called Sabatier and Senderen's reaction.

376 **(b)**

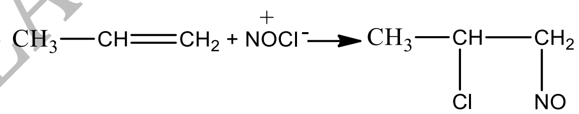


This reaction is an example of Friedel-Craft's reaction.

Mechanism:



377 **(a)**



This reaction is an example of electrophilic addition reaction and in it addition takes place according to Markownikoff's rule.

378 **(c)**

H_2SO_4 absorbs ethene.

379 **(d)**

These all are poisonous gases.

380 **(d)**

It is an anti-termite.

381 **(b)**

The boiling points of straight chain or n-alkanes increases regularly with increasing number of carbon atoms

382 **(b)**

$(C_2H_5)_4$ is anti-knock agent and increase octane no. of gasoline.

384 **(b)**

It is a fact.

385 **(d)**

It is definition.

387 **(a)**

When acetylene is passed through red hot iron tube, benzene is formed as

$3C_2H_2 \xrightarrow{\text{Red hot tube}} C_6H_6$

(X)

Reaction (a) also gives C_6H_6 (or X) as

$C_6H_5OH + Zn \xrightarrow{\text{Distillation}} C_6H_6 + ZnO$

389 **(a)**

$$\begin{array}{l} \quad\quad\quad\; CH_3 \\ \quad\quad\quad\quad | \\ CH_3 - CH - C - CH_3 \\ \quad\quad\;\; | \quad\quad | \\ \quad\quad OH \quad CH_3 \end{array}$$

3,3-dimethyl butane-2-ol

$$\xrightarrow[-H_2O]{\text{Conc.}H_2SO_4} H_3C - \underset{}{\overset{CH_3}{\overset{|}{C}}} = \overset{CH_3}{\overset{|}{C}} - CH_3$$

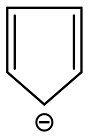
2,3-dimethyl-2-butene

(major product)

390 **(a)**

Fractional distillation of petroleum gives a large number of products aliphatic and aromatic.

391 **(a)**



(Cyclopenta dienyl anion)

According to Huckel's rule

Total number of π-electrons inside the ring

$(4n+2)\pi$ electrons.

$= (4 \times 1 + 2) = 6\pi$ electrons

So, it is aromatic.

392 **(a)**

Follow ozonolysis.

393 **(c)**

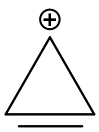
Natural gas is a mixture of 80% CH_4 and 10% C_2H_6+10% higher hydrocarbons.

394 **(b)**

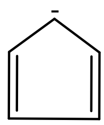
$C_2H_5Br + 2Na + BrC_2H_5 \rightarrow C_2H_5C_2H_5$ or n-butane.

395 **(c)**

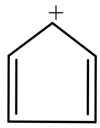
According to Huckel's rule an aromatic compound has $(4n+2)\pi$-electrons, where, n =0, 1, 2, 3,…etc.



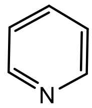
;$4n + 2 = 2; n = 0$; aromatic



; $4n + 2 = 6; n = 1$; aromatic



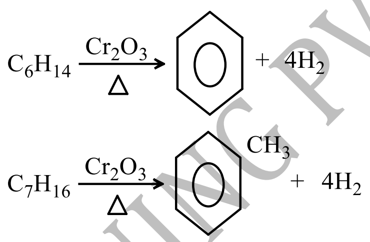
; $4n + 2 = 4; n = 0.5$; non − aromatic



; $4n + 2 = 6; n = 1$; aromatic

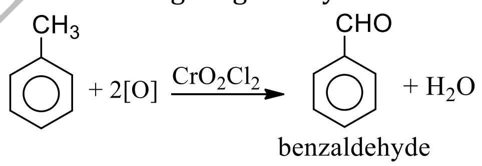
397 **(a)**

Alkanes with six to 10 carbons are converted to aromatic hydrocarbons, $e.g.$,



399 **(b)**

With acidic manganese dioxide or chromyl chloride, in CCl_4 solution, toluene and all other homologues of benzene are oxidized to terminal carbon atom giving aldehydes



402 **(d)**

All are dehydrating agents.

403 **(a)**

Terminal alkynes give white ppt. with am. $AgNO_3$

404 **(a)**

Alkyl halides can be reduced to hydrocarbons by means of Zn − Cu couple in presence of alcohol.

$C_2H_5I \xrightarrow[C_2H_5OH]{Zn-Cu} C_2H_6 + HI$

ethane

405 **(d)**

(i) **Wurtz reaction**

$2RX + 2Na \xrightarrow{\text{Ether}} R - R$

Alkane

(ii) **Kolbe's reaction**

$RCOONa + H_2O \xrightarrow{\text{Electrolysis}} R - R$

alkane

(iii) **Ulmann's reaction**

$2C_6H_5I + 2Cu \rightarrow C_6H_5 - C_6H_5$

biphenyl

(iv) **Frankland reaction**

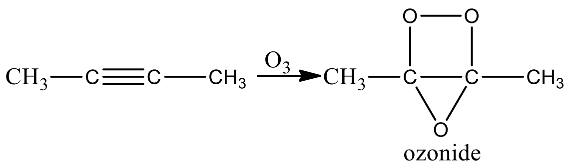
$2RX + \text{Zn} \rightarrow R - R$

alkyl halide alkane

406 **(c)**

Both carbon have two sigma bonds on each.

407 **(c)**



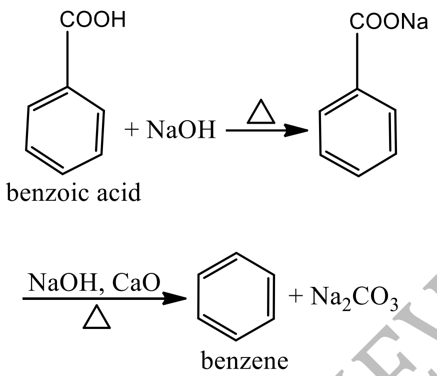
$$\xrightarrow[-H_2O_2]{Zn/H_2O} CH_3 - \underset{\underset{O}{\|}}{C} - \underset{\underset{O}{\|}}{C} - CH_3$$

408 **(d)**

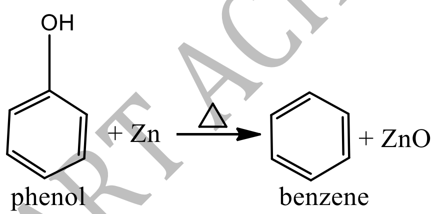
Note this temperature used in oxy-acetylene welding.

409 **(b)**

Benzene can be obtained by heating benzoic acid with sodalime.



Benzene can also be obtained by heating phenol with zinc dust.



410 **(d)**

Due to acidic hydrogen.

411 **(b)**

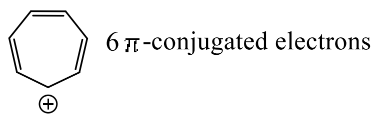
Fractional distillation of petroleum gives a large number of products aliphatic and aromatic.

413 **(c)**

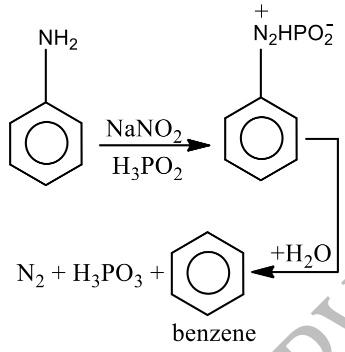
t. radicals are most readily formed.

414 **(d)**

According to the Huckel rule, a compound will be aromatic if compound should have $(4\pi + 2)\pi$ conjugated or delocalized electrons where n is a whole number and it may be $n =$ $0, 1, 2, 3, 4, 5, 6, \ldots$



415 **(b)**



In this reaction H_3PO_2 serves both as an acid as well as a reducing agent.

416 **(c)**

C_2Cl_6 is artificial camphor.

418 **(d)**

1, 3-butadiene is $CH_2 = CH—CH = CH_2$; alternate single and double bonds.

419 **(c)**

Hexane and onwards alkanes are sulphonated. Isobutene is also sulphonated due to 3°H-atom.

422 **(b)**

Acetylene has some acidic character and its hydrogen gets replaced by silver to give silver acetylide.

$CH \equiv CH + 2AgNO_3 + 2NH_4OH \rightarrow$

$AgC \equiv CAg \downarrow + 2NH_4NO_3 + 2H_2O$

white

423 **(c)**

Beryllium carbide gives CH_4, magnesium carbide (MgC_2) and calcium carbide (CaC_2) give acetylene while silicon carbide being covalent does not undergo hydrolysis

424 **(b)**

The greater the branching, smaller is surface area, lesser is attraction among molecules and so low b.p.

425 **(a)**

Chair form is more stable.

426 **(d)**

Both free radicals are used in terminating step.

427 **(d)**

It involves removal of a molecule from substrate.

428 **(a)**

$CH \equiv CH \xrightarrow{\text{Ozonolysis}} CHO.CHO$

$\xrightarrow{\text{Reduction}} CH_2OH.CH_2OH$

429 **(a)**

It is a test for unsaturation in molecule.

430 **(c)**

On electrolysis of potassium salt of fumaric and maleic acid, ethyne gas is obtained.

$$\begin{array}{l} CHCOOK \\ \| \\ CHCOOK \end{array} \xrightarrow{\text{Electrolysis}} \begin{array}{c} CH \\ ||| \\ CH \end{array} + 2CO_2 + 2KOH + H_2$$

Potassium maleate ethyne

431 **(a)**

Column I	Column II
Benzene	$(4n+2)\pi$-electrons
Ethylene	Mustard gas
Acetaldehyde	Silver mirror
Chloroform	Phosgene

Benzene has 6π-electrons, *i.e.*, it follows Huckel rule $(4n+2)\pi$-electrons. Ethylene reacts with S_2Cl_2 to give mustard gas (war gas).

433 **(b)**

Follow peroxide effect.

434 **(b)**

$CH_3CH_2CH_2CH=CH_2 + Br_2$

$\longrightarrow CH_3CH_2CH_2CHBrCH_2Br$

$\because$70 g C_5H_{10} requires 160 g Br_2

$\therefore$5g C_5H_{10} requires $\frac{160\times5}{70} = 11.43$g Br_2

435 **(c)**

These are characteristics of C_2H_4.

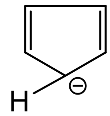
436 **(a)**

All those groups which contain at least one pair of non-bonding electrons on the atom adjacent to the benzene ring, are *ortho* and *para* directing. Among the given options, all are *ortho* and *para* directing but their capacity of *ortho* − *para* direction follows the order

$$-\ddot{N}H_2 > -CH_3 > -C_2H_5 > -Cl$$

Hence, $-\ddot{N}H_2$ is the strongest *ortho* − *para* directing groups.

437 **(a)**

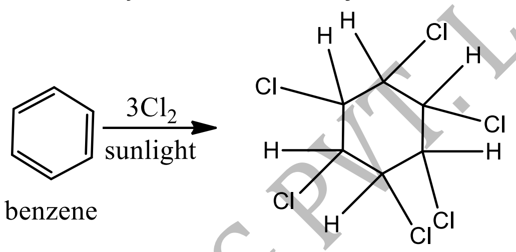


π electrons $= 4 + 2 = 6$

As it obeys Huckel rule, it is aromatic

438 **(c)**

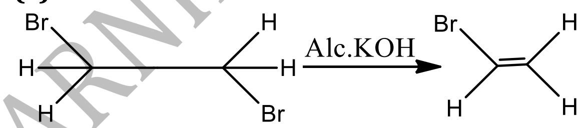
An insecticide, gammexane, is formed. It is also called benzene hexa chloride (BHC), though it is wrong. The correct chemical name is *syn*:hexachloro cyclohexane.



440 **(d)**

Alkane is $(C_2H_5)_4C$.

441 **(c)**



Vinylic bromide is more stable stronger base $(-NH_2^-)$ is required for elimination.

443 **(d)**

An infinite conformers of ethane are possible including staggered, skew and eclipsed forms.

444 **(c)**

By adding bromine water to a solution, if the colour of bromine water decolourise then the compound is unsaturated. This is a confirmatory test for unsaturation.

445 **(a)**

Halogenation in alkane follow free radical mechanism. Formation of free radical occurs in presence of light.

448 **(b)**

Removal of H_2O from a substrate by a dehydrating agent is called dehydration.

449 **(b)**

The catalyst used is called Ziegler's catalyst.

451 **(d)**

Terminal alkyne has acidic hydrogen which is enough to protonate the Grignard reagent.

$CH_3MgX + CH_3C \equiv CH$

$\rightarrow CH_4 + CH_3C \equiv CMgX$

452 **(b)**

$\underset{sp^2}{CH_2} = \underset{sp^2}{CH} - \underset{sp^2}{CH} = \underset{sp^2}{CH_2}$;

453 **(d)**

$$HCCl_3 + 6Ag + Cl_3CH \xrightarrow{\text{Heat}} HC \equiv CH + 6AgCl$$

Chloroform choloroform acetylene

Thus, in this reaction acetylene ($HC \equiv CH$) is produced.

454 **(d)**

Methyl iodide and ethyl iodide, on treatment with sodium in ethereal solution, give a mixture of propane, ethane and butane, as follows

$$CH_3\boxed{I + 2Na + I} - CH_2CH_3$$

$$\xrightarrow{\text{Ether}} CH_3CH_2CH_3 + 2NaI$$

Propane

$$CH_3I + 2Na + I - CH_3 \rightarrow CH_3 - CH_3 + 2NaI$$

ethane

$$C_2H_5I + 2Na + I - C_2H_5 \rightarrow C_2H_5C_2H_5 + 2NaI$$

butane

455 **(b)**

H is replaced by Cl.

456 **(c)**

$$CH \equiv CH + HOCl \longrightarrow CH(OH)_2\text{—}CHCl_2 \xrightarrow[-H_2O]{} CHOCHCl_2$$

457 **(c)**

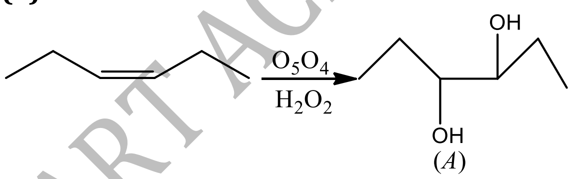
$$CH_2 = CH_2 \xrightarrow{HOCl} CH_2OH.CH_2Cl$$

458 **(d)**

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

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

459 **(a)**



A is meso diol.

460 **(b)**

Both are unsaturated and give Baeyer's test.

461 **(c)**

Conjugated alkadiene have alternate single and double bond,

$e.$g., $CH_2 = CH\text{—}CH = CH_2$.

463 **(c)**

Natural gas is 80% CH_4, coal gas contains 40% CH_4; Marsh gas is another name for CH_4.

464 **(b)**

Iodoform and Ag undergo dehalogenation reaction to produce acetylene.

(A)$HCOOK + H_2O \xrightarrow{\Delta} H_2 + CO_2 + KOH$

(B)$2CHI_3 + 6Ag \xrightarrow{\Delta} CH \equiv CH + 6AgI$

Iodoform silver acetylene

(C)$CH_3CH_2OH \xrightarrow[443K]{\text{Conc.}H_2SO_4} CH_2 = CH_2 + H_2O$

Ethylene

(D)$Be_2C + H_2O \rightarrow CH_4$

methane

465 **(c)**

In Wurtz reaction alkyl halide reacts with sodium in presence of dry ether to give alkanes $e.g.$,

$$C_2H_5\boxed{Cl + 2Na + Cl}C_2H_5$$

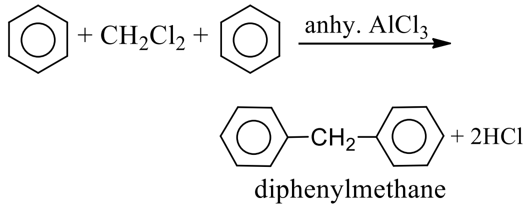
$$\xrightarrow[\text{(dry ether)}]{} C_4H_{10} + 2NaCl$$

butane

In Wurtz reaction wet ether is not used because wet ether destroy the sodium metal.

466 **(d)**

When excess of benzene reacts with CH_2Cl_2 in presence of anhy. $AlCl_3$,diphenylmethane is obtained



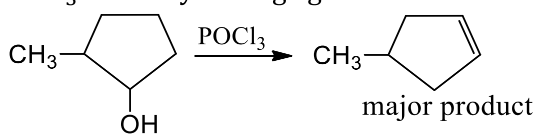
This reaction is an example of Friedel-Crafts' reaction

468 **(c)**

Gasoline among all has lowest b.bt.

469 **(b)**

$POCl_3$ is a dehydrating agent



470 **(c)**

$$CH \equiv CH + HOCl \longrightarrow CH(OH) = CHCl \xrightarrow{HOCl} CH(OH)_2CHCl_2 \longrightarrow CHCl_2.CHO$$

471 **(b)**

Reaction of 4-octyne and H_2 can be arrested at the alkene stage only by using palladium partially inactivated with trace of quinoline

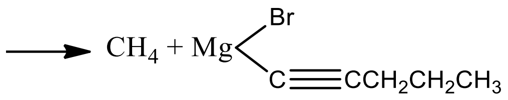
472 **(c)**

It is the name of reaction.

473 **(d)**

$CH_3 - CH_2 - CH_2 - C \equiv CH + CH_3MgBr$

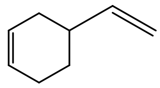
Methyl magnesium bromide



Due to the presence of acidic hydrogen (hydrogen attached to triply bonded carbon atom) terminal alkyne (d) will react with methyl magnesium bromide.

474 **(c)**

Degree of instauration= $\frac{2n_1+2-n_2}{2}$; where, n_1 is the number of carbon atoms and n_2 the number of hydrogen atoms.

In  compound

Number of carbon atoms =8

Number of hydrogen atoms=12

Degree of unsaturation= $\frac{2\times8+2-12}{2} = 3$

477 **(a)**

$C_2H_4 + H_2SO_4 \longrightarrow C_2H_5HSO_4$; addition of H_2SO_4 on ethane.

478 **(b)**

Peroxide effect is noticed only in case of HBr. For HCl follow Markownikoff's rule.

481 **(c)**

Pent-3-yne is not correct; it is pent-2-yne;

$CH_3 — C \equiv C — CH_2CH_3$.

482 **(b)**

$CH_3C \equiv CH \xrightarrow{[O]} CH_3COCOOH$

484 **(b)**

It is Corey House synthesis of alkanes.

487 **(b)**

Like gets dissolved in like; alkane and benzene both are non-polar.

488 **(a)**

CH_4 cannot be prepared by Kolbe's electrolysis; HCOONa gives $H_2$and CH_3COONa gives CH_4.

490 **(a)**

F_2 reacts more violently.

491 **(a)**

Markownikoff's as well as *anti*-Markownikoff's rules are valid for only asymmetric alkenes. 2-butene is a symmetric alkene.

492 **(c)**

This is electrophilic addition of HCN molecular across $C \equiv C$ in presence of vinyl cyanide.

$$\begin{array}{l} CH \\ ||| \\ CH + HCN \xrightarrow{Ba(CN)_2} \begin{array}{c} CH_2 \\ || \\ CHCN \end{array} \end{array}$$

Vinyl cyanide

494 **(d)**

It is a new anti-knocking agent used in place of tetraethyl lead to control lead pollution by gasoline in developed countries.

496 **(a)**

Angle strain in cyclopropane is 24°44′

$$\theta = \left[180 - \frac{360}{n}\right]$$
$$= \left[180 - \frac{360}{3}\right]$$
$$= 180 - 120 = 60°$$

Angle strain $\alpha = \frac{1}{2}[109°28' - \theta]$

$$= \frac{1}{2}[109°28' - 60°]$$
$$= 24°44'$$

497 **(a)**

When propyne reacts with water in presence of $HgSO_4$ and H_2SO_4 acetone is formed.

$$CH_3C \equiv CH + H.OH \xrightarrow[H_2SO_4]{Hg^{2+}} CH_3 - \underset{\underset{OH}{|}}{C} = CH_2$$

$$\xrightarrow[\text{Ketonisation}]{} CH_3 - \underset{\underset{O}{||}}{C} - CH_2$$

498 **(b)**

If two different alkyl halides ($R_1 - X$ and $R_2 - X$) are used, a mixture of three alkanes is obtained which are difficult to separate

499 **(d)**

$$CH_3CH_2CH = CHCH_3 \xrightarrow{\text{Ozonolysis}} CH_3CH_2CHO + CH_3CHO$$

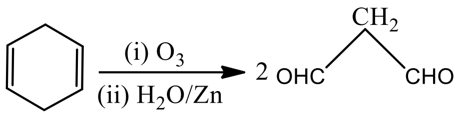
500 **(c)**

Chlorination of CH_4 is free radical mechanism.

501 **(d)**

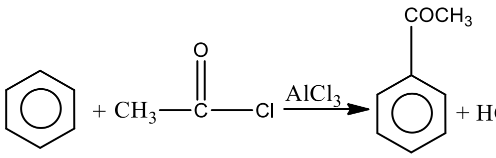
Unsaturated molecules decolourise Baeyer's reagent.

502 **(c)**
An alkene on reductive ozonolysis gives 2-molecules of $CH_2(CHO)_2$. Hence, the alkene is 1, 4-cyclohexadiene.



503 **(b)**
$C_2H_5I + C_3H_7I + 2Na$
$\xrightarrow{\text{Ether}} C_2H_5C_3H_7; C_4H_{10}; C_6H_{14}$

504 **(d)**
Friedel-Craft's acylation it involves the treatment of benzene with acetyl chloride or acetic anhydride in presence of anhydrous aluminium chloride.



acetophenone

505 **(b)**
Oxidation of 1-butene first gives a mixture of propionic acid and formic acid. Formic acid, however, gets further oxidised to
CO_2 and H_2O. Therefore, option (b) is correct.

507 **(b)**
A compound is said to be aromatic if it meets of the following criteria.

8. The rings of the compound should be planer.

9. The cyclic system must contain $(4\pi + 2)\pi$-electrons.

Only option (b) contains 6π-electron, so it is aromatic.

508 **(b)**
$CH_3CH = CH_2 \xrightarrow{B_2H_6} (CH_3CH_2CH_2)_3B$
$\xrightarrow{H_2O_2} CH_3CH_2CH_2OH + H_3BO_3$;
The process is called hydroboration.

509 **(b)**
(i)$CH_3 - CH = CH - CH_3 \xrightarrow[\frac{Zn}{H_2O}]{O_3}$
$CH_3CHO + CH_3CHO + ZnO$
2 molecules of ethanal
(ii)$C_6H_5CH = CH_2 \xrightarrow[\frac{Zn}{H_2O}]{O_3}$
$C_6H_5CHO + HCHO + ZnO$
benzaldehyde methanol
(iii)$CH_3CH = CH_2 \xrightarrow[\frac{Zn}{H_2O}]{O_3} CH_3CHO + HCHO$
Ethanol
methanol
(iv)$(CH_3)_2C = C(CH_3)_2 \xrightarrow[\frac{Zn}{H_2O}]{O_3}$
$CH_3COCH_3 + CH_3COCH_3 + ZnO$
2 molecules of acetone

511 **(c)**
Alkynes are not found in free state due to their high reactivity.

512 **(a)**
Least hindered rotation means free rotation, *i.e.*, round a single bond.

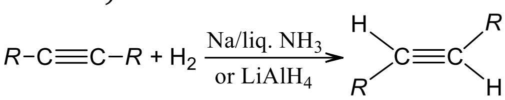
513 **(c)**
$H_2C = CH_2 \xrightarrow{HBr} CH_3 - CH_2Br$
(X)
$\xrightarrow{\text{Aq.KOH}} CH_3 - CH_2OH \xrightarrow[I_2\text{excess}]{Na_2CO_3} CHI_3$
(Y) (Z)
iodoform

515 **(b)**
In Wurtz reaction, an ether solution of an alkyl halide is treated with sodium which removes the halogen of alkyl halide and the two alkyl radicals join together to form an alkane

517 **(d)**
An immiscible and lighter substance with water will float over it.

518 **(d)**
These all are obtained from coal-tar.

519 **(b)**
For *trans*product we take Na/liquid NH_3 or $Li - NH_3/C_2H_5OH$ or $LiAlH_4$ as a reducing agnet (*anti*-addition)



trans-alkene

520 **(a)**
$CH_3CH = CH_2 + H\bar{O}Cl^+ \rightarrow CH_3 - CH - CH_2$
Propyene hypochlorous acid | OH | Cl
propene chlorohydrin

521 **(b)**
$CH \equiv CH + N_2 \rightarrow 2HCN$

522 **(a)**

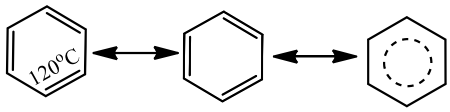
The reaction is as follows

$$CH_2{=}CH_2 \xrightarrow{HBr} \underset{(X)}{CH_3{-}CH_2Br} \xrightarrow{AgCN} \underset{(Y)}{CH_3CH_2NC} \xrightarrow[\text{reduction}]{H_2/Ni} \underset{(Z)}{CH_3CH_2NHCH_3}$$

N-methyl ethanamine

523 **(b)**

The structure of benzene is

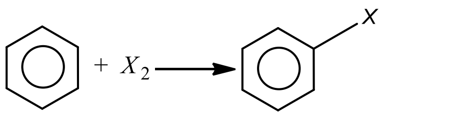


Bond order

$$= \frac{\text{number of bonds}}{\text{number of resonating structures}}$$

$$= \frac{4}{3} = 1.33$$

Since, the bond order is in between single and double bond, thus, it contains delocalised π-bonds. Hence, it is not possible to obtain number of single and double bonds in benzene.



(mono substituted product)

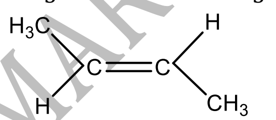
524 **(d)**

$-NO_2$ group withdraw electron from the ring shows$-M$ effect makes ring electron deficient, thus deactivates ring for electrophilic substitution.

525 **(b)**

Reaction of a non-terminal alkyne with a solution of an alkali metal (usually Na or Li or K) in liquid ammonia give a *trans*alkene.

$$CH_3-C\equiv C-CH_3 + 2[H] \xrightarrow{\text{Li/liq.NH}_3}$$



526 **(d)**

B.p. increases with increase in mol. Wt.

527 **(b)**

10. Benzene undergoes electrophilic substitution in presence of $AlCl_3$ or $FeCl_3$ or $ZnCl_2$.

11. Benzene does not undergo addition reactions like alkene.

$\therefore C_6H_6 + HOCl \xrightarrow{H^+}$no product and (b) is correct answer.

528 **(d)**

$C-H$ bond energy is greatest in ethyne due to the presence of triple bond.

529 **(b)**

$CH_3{-}CH = CH{-}CH_3$ is planer molecule due to $sp^2 - sp^2$-hybridised carbon atoms.

530 **(a)**

TEL increases the octane no. of gasoline.

531 **(d)**

The refining of petroleum is distillation process.

532 **(b)**

It is how Zn-Cu couple is used.

533 **(b)**

$CH_3{-}C\equiv C{-}CH_3$ is linear and symmetrical and thus, dipole moment is zero.

535 **(a)**

$RCOONa \longrightarrow R{-}R + 2CO_2 + 2NaOH + H_2$

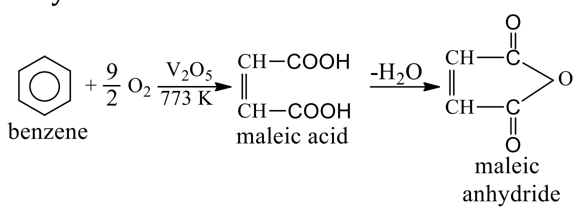
537 **(b)**

Only terminal alkynes give precipitate with ammoniacal silver nitrate solution.

Among the given, $CH_3-C\equiv CH-CH_3$ is not a terminal alkyne. Thus, it does not give precipitate with ammoniacal $AgNO_3$.

539 **(c)**

Benzene vapours mixed with air when passed over V_2O_5 catalyst at 775 K gives maleic anhydride

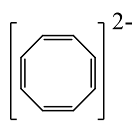


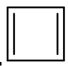
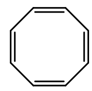
540 **(a)**

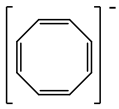
$2CH_3CH_2CH_2COONa \rightarrow$

$\underbrace{CH_3CH_2CH_2CH_2CH_2CH_3 + 2CO_2}_{\text{Anode}}\ \underbrace{+2NaOH + H_2}_{\text{Cathode}}$

541 **(d)**

Compound  has $8 + 2 = 10\pi$ electrons

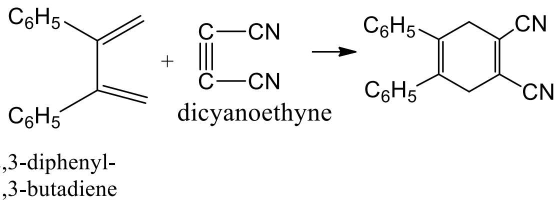
hence is aromatic.  has $4\pi e^-$,  has

$8\pi e^-$, while  has $8+1=9\pi e^-$, hence all these species are not aromatic

542 **(b)**

It is a mixture of solid hydrocarbons.

543 **(c)**



This reaction is an example of Diel's Alder reaction

544 **(d)**

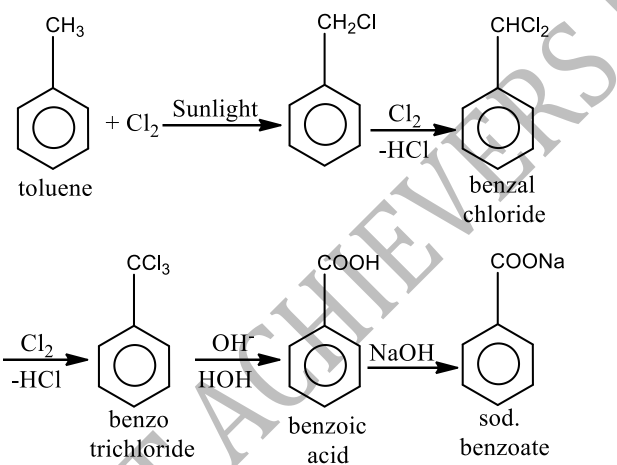
All of these can be used in cracking.

545 **(b)**

General formula of a cycloalkane is C_nH_{2n}.

546 **(b)**

Toluene reacts with excess of Cl_2 in presence of sunlight, the last product of this reaction is benzotrichloride which on hydrolysis gives benzoic acid, and it gives sodium benzoate on reaction with NaOH.



548 **(d)**

$CH_3CH_2COOH + NaHCO_3$
$\longrightarrow CH_3CH_2COONa + H_2O + CO_2$

549 **(a)**

$C_2H_2 + \frac{5}{2}O_2 \longrightarrow 2CO_2 + H_2O$; 1 mole or 1 vol. of C_2H_2 requires 2.5 mole or 2.5 vol. of O_2.

550 **(a)**

Conjugate dienesare mores stable than the other dienes.

551 **(c)**

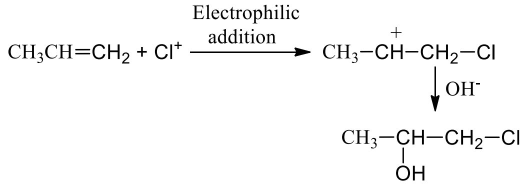
Branched chain alkanes give rise to increase on octane no.

552 **(d)**

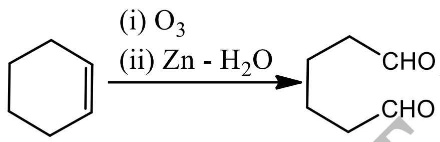
Follow Markownikoff's rule.

553 **(b)**

HOCl has Cl^+ and OH^- ions



554 **(b)**



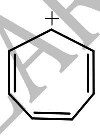
$Zn - H_2O$ is the reagent for reductive work up of ozonide. $H_2O_2 - CH_3COOH$ would give $HOOC-(CH_2)_4-COOH$.

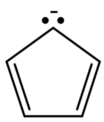
555 **(d)**

The π-bond is unshared in electromeric effect to give +ve and –ve centres on molecule.

$CH_2{=}CH_2 \xrightarrow{A.R.} \overset{+}{C}H_4 - \overset{-}{C}H_4$

556 **(d)**

 Tropylium cation is planar and have 6π-electron according to Huckel rule, hence it is aromatic.

 Cyclopentadienyl anion is planar and have 6π-electron, hence it is also aromatic compound.

557 **(a)**

Follow peroxide effect.

558 **(a)**

In the laboratory, nitrobenzene is prepared by nitration of benzene with the mixture of nitric acid and sulphuric acid at temperature below60°C. In which HNO_3 acts as a base

559 **(d)**

The reaction is ozonolysis. During the reaction C = C breaks to give carbonyl compounds.

$CH_3CH = CH_2 \xrightarrow[H_2O_2]{O_3} CH_3CHO + HCHO$

Acetaldehyde formaldehyde

560 **(a)**

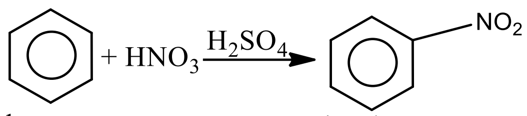
Petrol or gasoline contains mainly C_6 to C_{11}atoms liquid alkanes.

562 **(d)**
L.P.G. mainly contains butane and isobutane.
564 **(a)**
$$CH\equiv CH \xrightarrow{[O]} \begin{array}{l} COOH \\ | \\ COOH \end{array} ;$$
$$CH_2 = CH_2 \xrightarrow{[O]} 2HCOOH$$
565 **(a)**
According to Markownikoff's rule, the negative part of the reagent gets attached to that double bonded carbon atom which has least number of H-atoms. Thus,
$$CH_3 = CH - CH_3 \xrightarrow{HBr} CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$$
569 **(b)**
Gasoline contains alkanes from C_6 to C_{11} carbon atom.
570 **(d)**
We know that,
$Al_4C_3 + 12H_2O \rightarrow 4Al(OH)_3 + 3CH_4$
Thus, in this reaction methane (CH_4) is produced.
571 **(d)**
Follow Saytzeff rule of elimination.
573 **(b)**
Impurities of PH_3 give garlic smell to C_2H_2.
574 **(d)**
In the formation of an alkane from Grignard reagent, alkyl group always comes from Grignard reagent. Hence, the number of carbon atoms in the Grignard reagent and alkane formed Grignard reagent will be identical. So, the original alkyl halide is propyl bromide.
575 **(c)**
$$CH\equiv C \quad CH_3 \xrightarrow[Hg^{2+}/H_2SO_4]{H_2O}$$
$CH_2 = C(OH)CH_3 \rightleftharpoons CH_3COCH_3$;
The mechanism involves tautomerism.
576 **(d)**
$$C_2H_6 + \frac{7}{2}O_2 \longrightarrow 2CO_2 + 3H_2O$$
577 **(c)**
$$CH \equiv CH \xrightarrow{HBr} CHBr = CH_2 \xrightarrow{HBr}$$
$$CHBr_2 — CH_3 \xrightarrow{KOH(alc.)} CHBr = CH_2 \xrightarrow{NaNH_2} CH \equiv CH$$
578 **(d)**
According to Markownikoff's rule the addition of a reagent (HX) to an unsymmetrical alkene takes place in such a way that the negative part of the reagent will be attached to that carbon atom which contains lesser number of H-atom.
$$CH_3 - \underset{\underset{CH_3}{|}}{C} = CH_2 + HBr \rightarrow CH_3 - \overset{\overset{Br}{|}}{\underset{\underset{CH_3}{|}}{C}} - CH_3$$
2-methylpropene
579 **(b)**
Follow text.
580 **(a)**
Br_2solution is decolourized by alkene or alkyne or molecules having unsaturation.
581 **(c)**
Eqs. (i) and (ii) drawings are Sawhorse and Newman projections respectively for staggered forms.
582 **(a)**
C_2H_2gives white ppt. with amm. $AgNO_3$.
583 **(b)**
$$C_6H_5CH_3 \xrightarrow{\text{Oxidation}} \underset{(A)}{C_6H_5.COOH} \xrightarrow{NaOH}$$
$$\underset{(B)}{C_6H_5COONa} \xrightarrow[\text{(NaOH+CaO)}]{\text{Soda lime}} C_6H_6 + CO_2 \uparrow$$
585 **(c)**
Cyclobutadiene have (4π) conjugated or delocalized electrons, thus it is *anti*-aromatic
586 **(a)**
$$CH \equiv CH \xrightarrow{HOCl} Cl_2CHCHO$$
587 **(c)**
Thioalcohol (mercaptons) have unpleasant odour; C_2H_5SH is commonly used.
588 **(c)**
Octane no. of triptane or 2, 3, 3-trimethylbutane =124; octane no. of n-nonane=−45.
589 **(d)**
C_4H_6 may contains either two double bond or triple bond
$CH_2 = CH - CH = CH_2$ or$CH_3 - CH_2 - C \equiv CH$
590 **(b)**
Due to acidic—H-atom propyne forms $CH_3 — C \equiv CNa$ with Na.
591 **(b)**
More is b.p. lesser is volatile nature.

592 **(d)**
These all are used to increase octane number of fuel.

594 **(a)**
$CH_2 = C = CH_2$;
$sp^2 \quad sp \quad sp^2$

600 **(b)**
Benzene undergoes electrophilic substitution reaction. It is nitrated by HNO_3.



benzene nitro benzene

602 **(b)**
Markownikoff's rule is for addition of unsymmetrical additive on unsymmetrical alkene.

603 **(d)**
Paraffin wax are solid hydrocarbons from C_{20} to C_{30} atoms.

605 **(d)**
Methane is called marsh gas because it is found in swamps or marshy places and can be obtained by bacterial decomposition of fossils of plants and animals.

606 **(b)**
Among hydrocarbons, alkynes are easily oxidised.

607 **(d)**
B.P. change with branching.

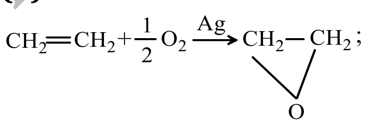
608 **(f)**
These are few oxidants.

609 **(a)**
The acidic character of H is,
$F—H > O—H > \equiv \underset{sp}{C}—H > N—H$; H-atom attached on F, O, N and triply bonded carbon is acidic.

610 **(b)**
$CH_3CH_2CH = CH_2 \xrightarrow{H_2/Pd} CH_3CH_2CH_2CH_3$.

611 **(c)**
Except acetylene, all terminal alkynes have only one acidic H-atom.

613 **(d)**



These compounds are known as epoxy ethane or oxirane or cyclic ethers.

614 **(b)**
According to X-ray analysis all carbon-carbon bond distance (1.397Å) are equal in benzene. The bond order of carbon-carbon bond is 1.5 in benzene.
Hence, carbon-carbon bond distance (1.397Å) is less than $C - C$ single bond (1.54Å) and more than $C = C$ double bond(1.33Å).

615 **(c)**
Cracking involves decomposition of higher alkanes to lower one on heating.

616 **(a)**
Follow mechanism of Wurtz reaction.

617 **(c)**
CH_4 is a constituent of bio-gas.

620 **(a)**
The lowest temperature at which an oil gives sufficient vapours to form an explosive mixture with air is referred as flash point. It is 44°C, 35°C, 22.8°C in India, France and England, respectively.

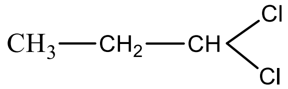
621 **(a)**
Lindlar's catalyst is $Pd - CaCO_3$deactivated by lead acetate. Cram *et. al* gave a better catalyst for this purpose as $Pd - BaSO_4$ poisoned by quinolene. This too is sometimes referred as Lindlar's catalyst.

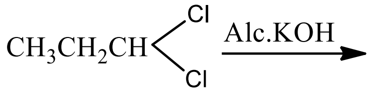
622 **(b)**
Remember this value.

623 **(a)**
The aldehydes formed are oxidized by H_2O_2formed during hydrolysis.

625 **(c)**
The acidic nature is $H_2O > C_2H_2 > NH_3$; thus, conjugate base order will be $OH^- > C_2H^- > NH_2^-$.

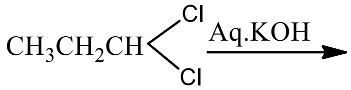
628 **(d)**
'X' is a three carbon compound with two halogen atom, so its molecular formula is $C_3H_6Cl_2$. Only terminal alkynes give red ppt. with ammoniacal Cu_2Cl_2, so the hydrocarbon produced by the reaction of 'X' with alc. KOH, must be a terminal alkyne ($i.e.$, $CH_3C \equiv CH$).
$C_3H_6Cl_2 \xrightarrow{\text{Alc.KOH}} CH_3C \equiv CH \xrightarrow{\text{Amm.}Cu_2Cl_2} CH_3C \equiv CCu \downarrow$
red ppt.
Compound (X) gives an aldehyde when reacts with aqueous KOH. This suggests that both the halogens are present on same terminal carbon atom. Thus, the formula of compound (X) is

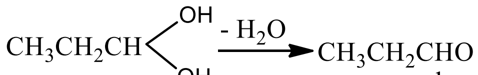

(1, 1-dichloropropane) and the reactions are as follows


$'X'$

$$CH_3C \equiv CH \xrightarrow[Cu_2Cl_2]{\text{Ammoniacal}} CH_3C \equiv CCu \downarrow$$

red ppt.


(X)
1, 1-dichloropropane


unstable propanal

629 **(a)**

$$CH_3CH_2OH \xrightarrow[-H_2O]{H_2SO_4} CH_2{=}CH_2;$$

Removal of H_2O is called dehydration.

630 **(d)**

Both vegetable and animal matter are origin of petroleum.

631 **(d)**

All are used in drying alkanes.

632 **(b)**

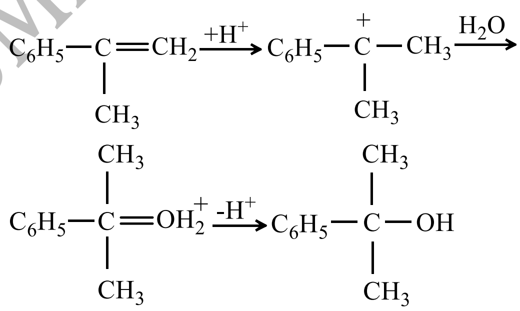
The stability order is:
Staggered>skew>eclipsed

633 **(d)**

Cyclic hydrocarbon, with carbon-carbon bond length between1.34Å and 1.54Å, is benzene in which due to resonance, $C-C$, bond length is 1.39Å (*ie*.,between 1.34Å − 1.54Å). Benzene is a hexagonal molecule with bond-angle equal to120°.

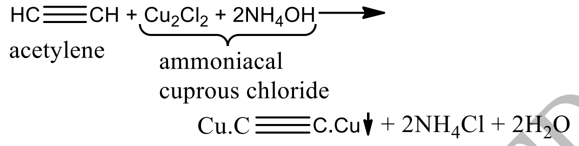
634 **(c)**

The reaction proceeds via carbocation mechanism.



635 **(c)**

Copper and silver alkylides are obtained by passing to alkynes in the ammoniacal solution of cuprous chloride and silver nitrate respectively. These reactions are used for detecting the presence of acetylenic hydrogen atom.


copper acetylide (red ppt.)

So, alkanes and alkenes remain unaffected.

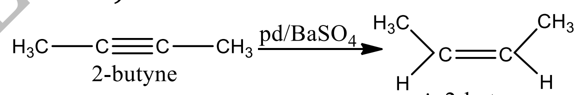
636 **(b)**

Benzene reacts with chlorine in presence of sunlight to give gammexane or benzene hexa chloride.

$$C_6H_6 + 3Cl_2 \xrightarrow{\text{Sunlight}} C_6H_6Cl_6$$

637 **(a)**

Hydrogenation in presence of Pd and $BaSO_4$ as *syn* addition and with Na and liquid NH_3 at 200 K is anti addition (*trans* compounds are formed.)


2-butyne *cis* 2-butene

638 **(c)**

In benzene all the six carbon atoms are sp^2 hybridised. Out of these three sp^2 hybrid orbitals of each C-atom, two orbitals overlap with sp^2 hybrid orbitals of adjacent C-atoms to form six $C-C$ single bonds. The remaining sp^2 orbital of each C-atom overlaps with s-orbitals of each H-atom to form six $C-H$ single sigma bonds. Each C-atom is now left with one unhybridised p-orbital perpendicular to the plane of the ring.

640 **(b)**

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

$$C_6H_6 + C_6H_5COCl \xrightarrow{AlCl_3} C_6H_5COC_6H_5 + HCl(80\%)$$

641 **(a)**

Aromatic compounds have delocalised π-electrons.
Out of given choices cyclohexane, CH_4, C_2H_6 and benzene, only benzene is aromatic

compound. Benzene has six delocalised π-electrons.

642 **(c)**

Trivial name is allyl.

643 **(d)**

These are all facts.

644 **(a)**

The reactivity order for sulphonation of H-atom in alkane :

$3° > 2° > 1°$.

645 **(a)**

As the $-CH_3$ group increases boiling point decrease

647 **(b)**

Alcoholic KOH is a dehydrohalogenating reagent, so when n-propyl bromide is treated with alcoholic KOH, propene is obtained.

$CH_3CH_2CH_2Br + \text{alc KOH}$

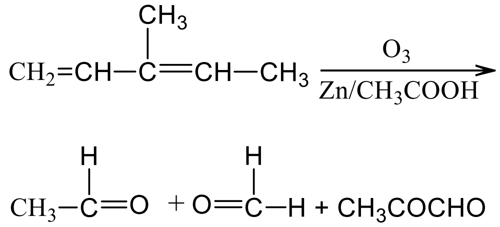
n-propyl bromide

$\rightarrow CH_3CH = CH_2 + HBr$

propene

648 **(b)**

Knowing the number and arrangement of carbon atoms in aldehydes and ketones the structure of the original alkene can be worked out.



649 **(a)**

A method used during II world war.

650 **(d)**

Ozonolysis of these two produces different products.

652 **(c)**

For simplest alkyne n=2; thus, alkyne is C_nH_{2n-2} or C_2H_2.

654 **(d)**

Alkene is $CH_3CH = CHCH_3$, a symmetrical alkene and therefore alcohol is,

$CH_3CH_2\underset{\displaystyle OH}{\underset{|}{C}}HCH_3$ which will give alkene-2 as major product.

655 **(b)**

Cyclodecapentaene and Cyclooctatetraene both are nonaromatic. Cyclobutadiene is antiaromatic while benzene having 6π-electrons is aromatic

656 **(d)**

$CH_3CH_2CH_2CH_2CH_2CH_3$;

$(CH_3)_2CHCH_2CH_2CH_3$;

$CH_3CH_2CH(CH_3)CH_2CH_3$;

$(CH_3)_3CCH_2CH_3$; $(CH_3)_2CHCH(CH_3)_2$

657 **(f)**

These are facts about alkanes.

658 **(c)**

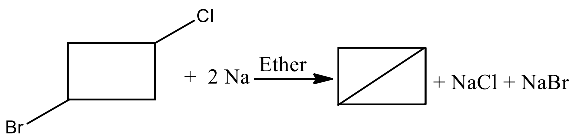
Due to resonance, benzene is quite stable and inspite of three double bonds does not decolourise Br_2 water.

659 **(c)**

Follow peroxide effect.

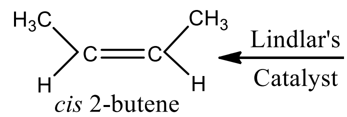
660 **(d)**

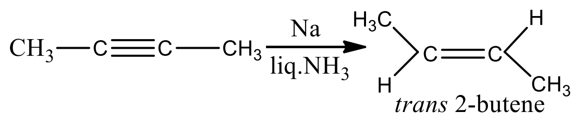
The reaction is Wurtz's type reaction.



661 **(a)**

Alkynes give different products with different reducing agents $e.g.$, with Lindlar's catalyst $(Pd/BaSO_4)$or Ni cis-alkene is formed but with Na in liquid NH_3 (Birch reduction) $trans$ alkene is formed.

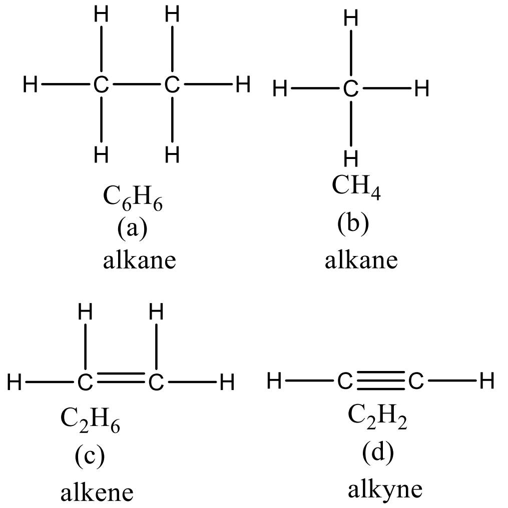




662 **(c)**

(i)Alkene and alkynes both react with $KMnO_4$ and decolourise it.

(ii)Only alkynes react with $AgNO_3$ to give white precipitate.



$\therefore$ C_2H_4 (an alkene) reacts with $KMnO_4$ and decolourises it and does not react with $AgNO_3$, C_2H_6 and CH_4 are alkane they do not react with $KMnO_4$ and NaOH.

663 **(c)**

It has maximum octane no.

664 **(c)**

Pure C_2H_2has ethereal odour.

666 **(a)**

Alkylated alkenes are more stable. More the alkylation of alkene, more will be its stability.

$\therefore$ Order of stability of alkenes is

$R_2C = CR_2 > R_2C = CHR > R_2C = CH_2$
$> RCH = CH_2 > CH_2 = CH_2$

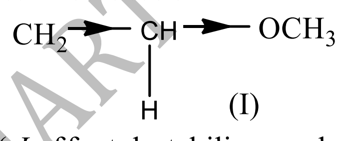
$\therefore$ Tetra alkylated alkene is most stable.

668 **(d)**

$CH_2 = CH - O - CH_3$

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

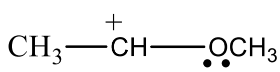
First protonation occurs, two possible intermediates are



(I)

(-I effect destabilizes carbocation)

and



(II)

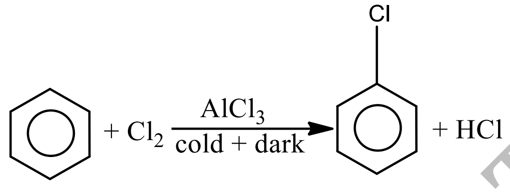
(+M effect stabilizes carbocation)

II, is more favourable. Hence, Br^- attacks, and product is

$CH_3 - \underset{\underset{Br}{|}}{CH} - O - CH_3$

670 **(b)**

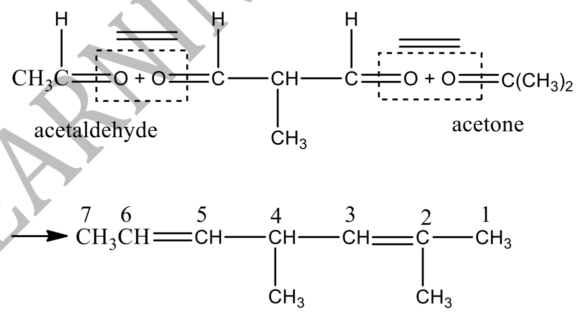
Halogenation of benzene in cold and dark is carried by electrophilic substitution. In this reaction, Cl^+ electrophile takes part in the reaction.



$AlCl_3 + Cl - Cl \longrightarrow \underset{\text{electrophile}}{Cl^+} + AlCl_4^-$

671 **(a)**

Since the alkadiene on reductive ozonolysis gives acetaldehyde (CH_3CHO), acetone (CH_3COCH_3) and 2-methylpropane-1, 3-dial [$OHCCH(CH_3)CHO$], the structure of alkadiene will be obtained as



672 **(b)**

These are Fischer-Tropsch and Berzius method for synthesis of petrol.

673 **(c)**

It is an unsaturated two carbon atom molecule (gives catalytic hydrogenation) but not acetylene (does not give white ppt. with amm. $AgNO_3$). Thus, it is ethylene.

674 **(c)**

$CH \equiv CH + Na \longrightarrow CH \equiv CNa \xrightarrow{RX} CH \equiv CR$

$CH = CH + RMgX \longrightarrow CH = CMgX \xrightarrow{RX} CH = CR$

675 **(b)**

Addition of HBr first takes place round double bond.

677 **(a)**

$CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$

$$\underset{\text{acetylene}}{\underset{(A)}{CH \equiv CH}} \xrightarrow{\text{Dil. } H_2SO_4/HgSO_4} \underset{\text{(unstable)}}{\underset{\text{vinyl alcohol}}{CH_2 = CHOH}} \longrightarrow \underset{(B)}{\underset{\text{acetaldehyde}}{CH_3CHO}}$$

678 **(c)**

An alkyne has higher b.p. than corresponding alkene and an alkene has higher b.p. than corresponding alkane.

681 **(d)**

On ozonolysis,

$$CH_2 = C = \overset{\overset{\displaystyle CH_3}{|}}{C} - CH = CH_2$$ gives two moles of HCHO, one mole of CO_2 one mole of CH_3COCHO.

$$CH_2 = C = \overset{\overset{\displaystyle CH_3}{|}}{C} - CH = CH_2 \xrightarrow[Zn]{O_3/H_2O}$$

$$2CH_2O + CO_2 + CH_3COCHO$$
(HCHO)

682 **(c)**

$$CH_3CH_2Cl \xrightarrow{\text{KOH alc.}} CH_2 = CH_2$$

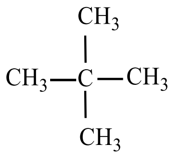
683 **(c)**

$$C_nH_{2n+2} + \left(\frac{3n+1}{2}\right)O_2 \longrightarrow nCO_2 + (n+1)H_2O$$

685 **(b)**

Cycloalkanes are isomeric with alkenes because they have same general formula C_nH_{2n} ($i.e.$, same molecular formula) but possessing different structures. They show ring chain isomerism.

686 **(b)**



is symmetrical alkane and will give only one monochloro substitution.

688 **(d)**

Rest all are used to convert>CO gp. to CH_2.

689 **(d)**

The presence of the chlorine atom on benzene ring makes the second substituent enter at *ortho* or *para* position because the chlorine atom is *ortho* − *para* directing.

690 **(a)**

Given, $C = \left(\frac{12}{13}\right) \times 100\%$, $H = \left(\frac{1}{13}\right) \times 100\%$

$\therefore$ $C = 92.3\%$ $H = 7.69\%$

$$C = \frac{92.3}{12} = 7.69 = \frac{7.69}{7.69} = 1$$

$$H = \frac{7.69}{1} = 7.69 = \frac{7.69}{7.69} = 1$$

$\therefore$ Empirical formula of hydrocarbon is $C_1H_1 = CH$

$\therefore$ A has empirical formula CH and decolourises bromine water.

$\therefore$ It is alkyne which is C_2H_2.

$\therefore$ B has empirical formula CH and does not decolourise bromine water.

$\therefore$ It is benzene C_6H_6.

691 **(c)**

Due to acidic nature of the hydrogen atoms attached to a triple bond, acetylenes and terminal alkynes from metal acetylides

$$CH_3CH_2C \equiv CH + AgNO_3 + NH_4OH \rightarrow CH_3CH_2C \equiv CAg + NH_4NO_3 + H_2O$$

silver butynide

693 **(b)**

Cetane no. represent percentage of n-hexadecane in mixture.

694 **(c)**

Conjugated alkadienes show 1 : 2 and 1 : 4 addition.

695 **(d)**

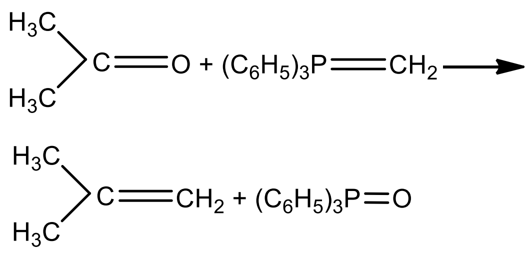
Na/C_2H_5OH, $LiAlH_4$ or $NaBH_4$ are used for this purpose.

696 **(c)**

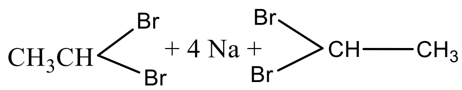
This is also a mean of preparing alkene where the position of the double bond is definite. In Wittig reaction, aldehyde (−CHO) and ketone (> C = O) react with methylene tryphenyl phosphine $[(C_6H_5)_3P = CH_2]$ to give alkene.

$$CH_3CHO + (C_6H_5)_3P = CH_2$$
$$\rightarrow CH_3 - CH = CH_2 + (C_6H_5)_3P = O$$

Propane triphenyl phosphine oxide



697 **(c)**



$$\xrightarrow[\Delta]{\text{Ether}} CH_3 - CH = CH - CH_3 + 4NaBr$$

2-butene

699 **(d)**

Octane number is a measure of quality of fuel.

700 **(d)**

All possible products are obtained; C_2H_6 by

CH_3COO^-; C_4H_{10} by $CH_3CH_2COO^-$ and $CH_3CH_2CH_3$ by CH_3COO^- and $CH_3CH_2COO^-$.

701 **(b)**

Wurtz reaction is used to prepare alkanes from alkyl halides.

$$2R - X + 2Na \xrightarrow{\text{Dry ether}} R - R + 2NaX$$

702 **(b)**

$$CH_2Br—CH_2Br \xrightarrow{\text{Zn dust}} CH_2 = CH_2$$

703 **(a)**

A group that causes attack to occur chiefly at positions *ortho* and *para* to it, is called an *ortho* − *para* director, *e.g.*, NH_2, OH, Cl etc.

704 **(c)**

NH_3 is base, *i.e.*, least acidic.

705 **(c)**

This is Wurtz reaction.

706 **(c)**

$$CH_3CH_2CH = CH_2 \xrightarrow{HBr} CH_3CH_2CH_2CH_2Br \xrightarrow{C_2H_5ONa} CH_3CH_2CH_2CH_2OCH_2CH_3$$

707 **(c)**

1,1-dibromocyclooctane possess lesser strain.

710 **(d)**

__do___

712 **(c)**

According to Markownikoff's rule, the addition of a unsymmetrical reagent (H*X*) to an unsymmetric alkene takes place in such a way that the negative part of the reagent will be attached to the carbon atom which containing lesser number of H-atom. Hence, it is best applicable to the reaction between C_3H_6 and HBr.

$$CH_3CH = CH_2 + HBr \rightarrow CH_3 - \underset{\substack{|\\ Br}}{CH} - CH_3$$

713 **(b)**

The addition of propene to HBr opposes the Markownikoff's rule in presence of organic peroxide.

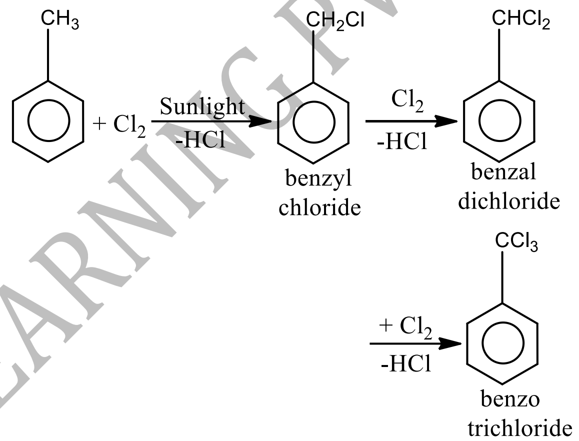
$$CH_3CH = CH_2 + HBr \xrightarrow[\text{peroxide}]{\text{Organic}} CH_3CH_2CH_2Br$$

n-propyl bromide

It is also called the Kharash effect or *anti*-Markownikoff's rule.

715 **(d)**

In presence of sunlight toluene undergoes aliphatic substitution with chlorine and give benzyl chloride, benzal chloride and benzo trichloride.



716 **(c)**

$$RCH_3 \xrightarrow{[O]} RCOOH$$

717 **(d)**

Uses of ethene.