SOLVED EXAMPLES

ALKANE

Ex.1 Which of the following reaction can be employed for getting unsymmetrical alkanes in good yield?

(A) Wurtz reaction **(B)** Corey-House reaction **(C)** Both **(D)** None of these **Ans.(B)**

Sol. Wurtz reaction is suitable for symmetrical alkanes

Ex.2 Sodium propionate on decarboxylation with sodalime gives

(A) Propane **(B)** Ethane **(C)** Butane **(D)** Pentane **Ans.(B)**

Sol. Decarboxylation with soda lime results in the formation of alkane with one carbon less than the starting compounds.

Ex.3 Which of the following alkanes cannot be produced by Kolbe electrolysis of sodium or potassium salts of carboxylic acids?

(A) Methane **(B)** Ethane **(C)** Butane **(D)** Hexane **Ans.(A)**

Sol. In Kolbe electrolysis, the alkane is formed by union of two alkyl groups. The alkane formed has, thus, two or more carbon atoms.

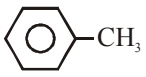
Ex.4 The homolytic fission of hydrocarbon results in the formation of –

(A) Free radicals **(B)** Carbocations **(C)** Carbanions **(D)** Carbenes **Ans.(A)**

Sol. Homolytic fission results in the formation of free radicasl.

Ex.5 n-Heptane when heated to a temperature of about 800 K under high pressure in the presence of Cr_2O_3/Al_2O_3 catalyst gives

(A) 1-heptene **(B)** 2-Methylhexane **(C)** Toluene **(D)** Xylene **Ans.(C)**

Sol. $CH_3-(CH_2)_5-CH_3 \xrightarrow{-4H_2}$ 

Toluene

Ex.6 The reaction conditions leading to the best yield of C_2H_5Cl are –

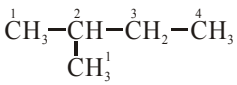
(A) C_2H_5 (excess) $+ Cl_2 \xrightarrow{\text{UV light}}$ **(B)** $C_2H_6 + Cl_2 \xrightarrow[\text{room temperature}]{\text{Dark}}$

(C) $C_2H_6 + Cl_2$ (excess) $\xrightarrow{\text{UV light}}$ **(D)** $C_2H_6 + Cl_2 \xrightarrow{\text{UV light}}$ **Ans.(D)**

Sol. C_2H_6 should be used in excess, otherwise polychlorination will take place

Ex.7 Number of isomer which can be theoretically obtained on monochlorination of 2-methylbutane is –

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4 **Ans.(D)**

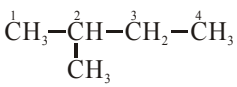
Sol. 

Ex.8 Complete oxidation of ethane yields –

(A) Ethanol **(B)** Ethanoic acid **(C)** Ethanal **(D)** CO_2 and H_2O **Ans.(D)**

Sol. $2C_2H_6 + 7O_2 \rightarrow 4CO2 + 6H_2O$

Ex.9 In iso-pentane, the H atom that can be most easily substituted is on –



(A) C –1 **(B)** C – 2 **(C)** C – 3 **(D)** C – 4 **Ans.(B)**

Sol. Ease of substitutation of various types of H atom is 3° > 2° > 1°.

Ex.10 8 c.c. of gaseous hydrocarbon requires 40 c.c. of O2 for complete combustion. Identify hydrocarbon.

Sol. Volume of hydrocarbon = 8 c.c. ; Volume of O_2 = 40 c.c.

Formula No.1, $\frac{8}{40} = \frac{2}{3n+1}$ (For alkane)

$\frac{1}{5} = \frac{2}{3n+1}$ or $3n + 1 = 10$ or $3n = 10 - 1 = 9$, $n = 2$

The value of n comes in whole number from 1st formula it means hydrocarbon is Alkane and it is of 3C atom.

$\therefore$ Hydrocarbon is C_3H_8 (Propane)

Ex.11 10 mL of a mixture of CH_4 and C_3H_8 requires 41 mL of oxygen for complete combustion. What is the volume of CH_4 and C_3H_8 in the mixture.

Sol. Suppose the volume of CH_4 in $(CH_4 + C_3H_8)$ mix = x c.c.

= Volume of C_3H_8 will be = 10 – x c.c.

For CH_4 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

$\because$ 1 vol. of CH_4 requires 2 vol. of O_2 for complete combustion

$\therefore$ x c.c. of CH_4, 2x c.c. of O_2

For C_3H_8 $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

$\because$ 1 volume of C_3H_8 requires 5 ml of O_2 for complete combustion

$\therefore$ (10 – x) c.c. of C_3H_8 requires 5(10 – x) c.c. of O_2

Total Volume of O_2 = 2 x + 5 (10 – x) it is equivalent to 41

(according to question)

$\because$ $2x + (10 - x) = 41$

$\therefore$ $x = 3$ c.c.

Volume of CH_4 is 3 c.c. and volume of C_3H_8 is 7 c.c.

ALKENE

Ex.1 90 mL of oxygen is required for complete combustion of unsatuarated 20 mL gaseous hydrocarbon, hydrocarbon is ?

Sol. Following two formulae can be used for solution of the above asked question.

$$\frac{\text{Volume of Hydrocarbon}}{\text{Volume of } O_2} = \frac{2}{3n} \quad \text{(for Alkene)}$$

$$\frac{\text{Volume of Hydrocarbon}}{\text{Volume of } O_2} = \frac{2}{3n-1} \quad \text{(for Alkyne)}$$

By putting the values in above formulae we can find the hydrocarbon for which n is natural number.

$\frac{20}{90} = \frac{2}{3n}$ n = 3 So hydrocarbon is Propene $[C_3H_6]$.

Ex.2 How many mole of oxygen is required for complete combustion of 1 mole of Alkene.

Sol. $2C_nH_{2n} + 3nO_2 \longrightarrow 2nCO_2 + 2nH_2O$

keeping in mind, the above equation.

$\because$ for 2 mole of Alkene, 3n mole of O_2 is required for combustion.

$\therefore$ for 1 mole of Alkene, $\frac{3n}{2}$ mole of O_2 is required for combustion.

= 1.5n mole of O_2

Ex.3 30 mL mixture of ethylene and Butylene is burnt in presence of oxygen then 150 mL of oxygen is required, what is the volume of Ethylene & Butylene in mixture.

Sol. Let the volume of C_2H_4 = x mL

So volume of Butylene = (30–x) mL

For C_2H_4 $\quad C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

from equation

$\because$ for 1 volume C_2H_4, 3 volume of O_2 is required.

$\because$ for x mL vol. of C_2H_4, 3x ml volume of O_2 is required.

For C_4H_8 $\quad C_4H_8 + 6O_2 \longrightarrow 4CO_2 + 4H_2O$

$\because$ for 1 volume C_4H_8, 6 volume of O_2 is required.

$\because$ for (30–x) mL " " , 6 (30–x) mL of O_2 is required.

Total volume of O_2 = 3x + 6 (30–x) mL = 150 mL(Given)

x = 10

$\because$ Volume of C_2H_4 in mixture is 10 mL

$\because$ Volume of C_2H_4 in mixture is 20 mL

ALKYNE

Ex. 1 $R-CH_2-CCl_2-R \xrightarrow{\text{Reagent}} R-C\equiv C-R$. The reagent is –

(A) Na **(B)** HCl in H_2O **(C)** KOH in C_2H_5OH **(D)** Zn in alcohl **Ans.(C)**

Sol. Alcoholic KOH brings about dehydrohalogenation

Ex. 2 Acetylene when treated with dilue HCl at 60°C (333 K) in presence of $HgCl_2$ products –

(A) Methyl chloride **(B)** Vinyl chloride **(C)** Acetaldehyde **(D)** Formaldehyde **And.(B)**

Sol. **(B)** $H-C\equiv C-H + HCl \xrightarrow[60°]{HgCl_2} CH_2=CH-Cl$

Vinyl chloride

Ex. 3 When propyne is treated with aqueous H_2SO_4 in the presence of $HgSO_4$, the major product is –

(A) Acetaldehyde **(B)** Propanal **(C)** 2-Propanol **(D)** Prtopanone **Ans.(D)**

Sol. $CH_3-C\equiv CH + H_2O \longrightarrow CH_3-\underset{\underset{OH}{|}}{C}=CH_2 \rightleftharpoons CH_3-\underset{\underset{O}{||}}{C}-CH_3$

Ex. 4 Alkaline $KMnO_4$, oxidizes acetylene to –

(A) Acetic acid **(B)** Glyoxal **(C)** Oxalic acid **(D)** Ethylene glycol **Ans.(C)**

Sol. $H-C\equiv C-H+4H[O]\rightarrow \begin{matrix}COOH\\|\\COOH\end{matrix}$

Ex. 5 Which of the following is most acidic –

(A) Ethyne **(B)** Propyne **(C)** 1-Butyne **(D)** 2-Butyne **Ans.(A)**

Sol. Because ethyne gives most stable anion.

Ex. 6 Ozonolysis of acetylene gives –

(A) Oxalic acid **(B)** Ethylene glycol **(C)** Glkyoxal **(D)** CH_3CHO **Ans.(C)**

Sol. $HC\equiv CH \xrightarrow[(ii)\ H_2O/Zn]{(i)\ O_3} H-\underset{\underset{O}{\|}}{C}-\underset{\underset{O}{\|}}{C}-H$

Glyoxal

Ex. 7 Propyne on reaction with aquesou chlorine gives –

(A) 1, 1, 2, 2-Tetrachloropropane **(B)** 1, 2-Dichloropropene

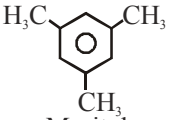
(C) 1, 1-Dichloropropanone **(D)** 2, 2-Dichloropropanone **Ans.(C)**

Sol. $CH_3-C\equiv CH+2HOCl\rightarrow \left[CH_3-\underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{C}}-CHCl_2\right] \xrightarrow{-H_2O} CH_3-\overset{\overset{O}{\|}}{C}-CHCl_2$

Ex. 8 Mesitylene can be obtained by polymerization of –

(A) Ethyne **(B)** Ethene **(C)** Propene **(D)** Propyne **Ans.(D)**

Sol. Propyne on trimerization yields mesitylene $3CH_3C\equiv CH\rightarrow$



Mesitylene

Ex. 9 Excess of Ch3COOH is reacted with $CH\equiv CH$ in presence of Hg^{2+}, the product is –

(A) $CH_3CH(OOCCH_3)_2$ **(B)** $CH_2=CH(OOCCH_3)$

(C) $(CH_3COO)CH_2-CH_2(OOCCH_3)$ **(D)** None of these **Ans.(A)**

Sol. $H-C\equiv C-H+2CH_3COOH\longrightarrow CH_3-CH(OCOCH_3)_2$

Both the protons go to same carbon atom

Ex. 10 A compound is treate with $NaNH_2$ to give sodium salt. Identify the compound –

(A) C_2H_2 **(B)** C_6H_6 **(C)** C_2H_6 **(D)** C_2H_4 **Ans.(A)**

Sol. Ethyne is acidic in character

$$H-C\equiv C-H+NaNH_2\longrightarrow H-C\equiv C^-Na^+ +\frac{1}{2}H_2$$

Exercise # 1 [Single Correct Choice Type Questions]

1. Which has least carbon bond length –
(A) Ethane **(B)** Ethyne **(C)** Ethene **(D)** Ethanol

2. The highest boiling point is expected for –
(A) isooctane **(B)** n-octane
(C) 2,2,3,3-tetramethylbutane **(D)** n-butane

3. The reaction of chlorine with methane is carried out in sunlight. The role of sunlight is
(A) To break Cl_2 molecules into free radicals **(B)** To break Cl_2 molecules into ions
(C) To heat up the mixture **(D)** To break C–H bonds in CH_4

4. The chlorination of an alkane involves :
(A) Cl free radicals **(B)** Cl^+ species **(C)** Cl^- species **(D)** CH_4 free radicals

5. The compound with highest boiling point is
(A) n-hexane **(B)** n-pentane **(C)** 2,2-dimethyl propane **(D)** 2-methyl butane

6. Which of the following will have least hindered rotation about carbon-carbon bond?
(A) Ethane **(B)** Ethylene **(C)** Acetylene **(D)** Hexachloroethane

7. Alkanes are readily attacked by –
(A) Electrophiles **(B)** Nucleophiles **(C)** Free radicals **(D)** bases

8. Isopropyl bromide undergoes Wurtz reaction to form –
(A) Hexane **(B)** 2, 3-Dimethyl butane **(C)** Propane **(D)** Neohexane

9. Alkanes can be prepared from Grignard reagents by reacting with –
(A) Alcohols **(B)** Primary amines **(C)** Alkynes **(D)** All of them

10. Which reducing agent is used in Clemmensen reduction –
(A) Zn/ HCl **(B)** $LiAlH_4$ **(C)** Zn-Hg/HCl **(D)** Na/C_2H_5OH

11. Isomerisation in alkane may be brought about by using
(A) Al_2O_3 **(B)** Fe_2O_3 **(C)** $AlCl_3$ and HCl **(D)** concentrated H_2SO_4

12. Formatio of alkane by the action of Zn on alkyl halide is called –
(A) Frankland reaction **(B)** Wurtz reaction **(C)** Cannizzaro's reaction **(D)** Kolbe's reaction

13. The hydrocarbon which is a liquid at room temperature is –
(A) butane **(B)** propane **(C)** decane **(D)** neopentane

14. 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

15. Which of the following will not produce ethane
(A) Reduction of CH_3COOH with HI/P_4
(B) Reduction of CH_3COCH_3 with HI/P_4
(C) Decarboxylation of sodium propionate with soda lime
(D) Hydrogenation of ethene in the presence of Ni.

16. The thermal decomposition of alkanes in the absence of air is known as –
(A) oxidation **(B)** Combustion **(C)** Hydrogenation **(D)** pyrolysis

17. Methane can be prepared by :
(A) Wurtz reactions **(B)** hydrogenation **(C)** decarboxylation **(D)** dehydrohalogenation

18. Whihc of the following alkyl halides is not suitable for Corey-House synthesis of alkanes –
(A) CH_3I **(B)** C_2H_5Br **(C)** $CH_3CH_2CH_2CH_2I$ **(D)** $(CH_3)_3CBr$

19. An alknae is most likely to react with –
(A) A free radical **(B)** An alkali **(C)** An electrophilic **(D)** A nucleophile

20. The most volatile alkane is :
(A) n-pentane **(B)** isopentane **(C)** neopentane **(D)** n-hexane

21. Which of the following reactions does not involved a C–C bond formation?
(A) Hydrolysis of a Grignard reagent **(B)** Combination of two alkyl free radicals
(C) Corey-House synthesis of alkanes **(D)** $RNa + R-Br \rightarrow R-R + NaBr$

22. Wurtz reaction on a mixture of ethyl halide and isobutyl halide gives –
(A) Butane and isobutane **(B)** Butane and 2, 5-dimethylhexane
(C) Butane,2,5-dimethylhexane and isohexane **(D)** Butane and isohexane

23. Which reducing agent is used in Clemmensen reduction ?
(A) Zn/HCl **(B)** $LiAlH_4$ **(C)** Zn-Hg/HCl **(D)** Na/C_2H_5OH

24. The compound 1,3-butadiene has –
(A) Only sp hybridized cabon atoms **(B)** Only sp^2 hybridized carbon atoms
(B) Both sp and sp^2 hybridized carbon atoms **(D)** sp, sp^2 and sp^3 hybridized carbon atoms

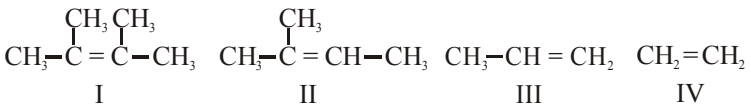
25. Alkene can be formed from carbonium ion by
(A) Combination of proton **(B)** Elimination of hydride ion
(C) Elimination of proton **(D)** First combination of H then removal of H

26. In ethylene dichloride there are –
(A) One π-bond and five σ-bond **(B)** Zero π-bond and seven σ-bond
(C) One π-bond and six σ-bond **(D)** One π-bond and six σ-bond

27. Propylene is mnore stable than ethylene. The reason for this is the –
(A) Electromeric effect **(B)** Hyper conjugation **(C)** Inductive effect **(D)** Resonance effect

28. The disappearance of the charactheristic purple colour of $KMnO_4$ in its reaction with an alkene is the test for unsaturation. It is known as :
(A) Maqrkownikoffs test **(B)** Baeyer's test **(C)** Wurtz test **(D)** Grignard test

29. The relative stability of the compounds



I II III IV

is in the order –

(A) I > II > III > IV **(B)** IV > III > II > I **(C)** I > III > II > IV **(D)** II > I > IV > III

30. Baeyer's reagentis used in the laboraqtory for –

(A) Detection of double bonds **(B)** Detection of glucose

(C) Reduction **(D)** Oxidation

31. The presence of unsaturation in an organic compound can be tested with –

(A) Schiff's reagent **(B)** Tollen's reagent **(C)** Fehling solution **(D)** Baeyer's reagent

32. In the sequence of reactions, $CH_3CH_2CH_2OH \xrightarrow{PCl_5} A \xrightarrow[KOH]{alc.} B$, the product B is –

(A) Propyne **(B)** Propylene **(C)** Propane **(D)** Propanol

33. Ethyl chloride on heating with alcoholic potash gives :

(A) C_2H_4 **(B)** C_2H_2 **(C)** C_2H_6 **(D)** CH_4

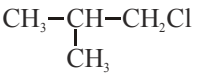
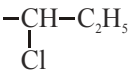
34. The ease of dehydration of an alcohol with concentrated H_2SO_4 is:

(A) 3° > 2° > 1° **(B)** 3° < 2 ° < 1° **(C)** 3° > 2° < 1° **(D)** 3° < 2° > 1°

35. Propyl bromide on reaction with alcoholic KOH gives –

(A) Propane **(B)** Propene **(C)** Butane **(D)** Acetylene

36. Which of the following compound undegoes dehydrochlorination most easily when treated with alcoholic KOH –

(A)  **(B)**  **(C)** $CH_3-CH_2-CH_2Cl$ **(D)** $(CH_3)_3C-Cl$

37. The formation of 2-butene from 2-butanol in the presence of conc. H_2SO_4 in in accordance with :

(A) Hoffmann's rule **(B)** Saytzeff's rule **(C)** Markownikoff's rule **(D)** Kharasch rule

38. In the elimination of reaction,s that is, in the formation of alkenes, the reactivity of halogens in alkyl halides is in the order –

(A) I > Br > Cl **(B)** Cl > Br > I **(C)** Br > Cl > I **(D)** None

39. In dehydrohalogenations the base (alcoholic KOH) abstracts –

(A) The halide ion

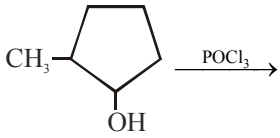
(B) The proton present on the carbon next to the carbon to which the halogen is attached

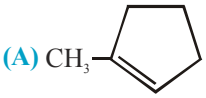
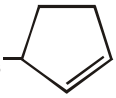
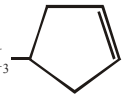
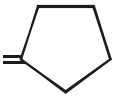
(C) The proton present on the carbon to which the halogen is attached

(D) The proton on the α-carbon.

40. The ease of dehydrohalogenation of alkyl halide with alcoholic KOH is –
(A) $3° > 2° > 1°$ **(B)** $3° < 2° < 1°$ **(C)** $3° > 2° > 1°$ **(D)** $3° < 2° > 1°$

41. The dehydrohalogenatin of 2-bromobutane with alcoholic KOH gives –
(A) only 2-butene **(B)** only 1-butene
(C) 2-buten as the major product **(D)** I-butene as the major product

42.  A (major), A is –

(A)  **(B)**  **(C)**  **(D)** 

43. 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

44. The most common reactions of alkenes are –
(A) Nucleophilic substitution **(B)** Electrophilic substitution
(C) Electrophilic addition **(D)** Nucleophilic addtion

45. On heationg n-propyldimethylamine oxide, propene is obtained. The reaction is known as –
(A) Cope reaction **(B)** Wurtz reaction **(C)** Prileschaiev's **(D)** None of these

46. The main product produced in the dehydrohalogenation of 2-bromo-3,3-dimtheylbutane is –
(A) 3,3-dimethylbutene **(B)** 2,3-dimethylbutene **(C)** 2,3-dimethylbut-2-ene **(D)** 4-methylpent-2-ene

47. Alcohols undergo dehydration in the following sequence –
(A) $1° > 2° > 3°$ **(B)** $3° > 2° > 1°$ **(C)** $1° > 3° > 2°$ **(D)** $3° > 1° > 2°$

48. The reaction : $CH_2=CHCH_3 + HBr \longrightarrow CH_3CHBrCH_3$ is –
(A) Nucleophilic additon **(B)** Electrophilic additon
(C) Electrophilic substitution **(D)** Free radical addition

49. The ozonolysis of an olefin gives only propanone. The olefin is :
(A) propene **(B)** but-1-ene **(C)** but-2-ene **(D)** 2,3-dimethylbut-2-ene

50. Aqueous sulphuric acid reacts with 2-methyl-1-butene to give predominantly –
(A) Isobutyl hydrogen sulphate **(B)** 2-methyl-2-butanol
(C) 2-methyl-1-butanol **(D)** Secondary butyl hydrogen sulphate

51. Olefines can be converted to paraffins by –
(A) Halogenation **(B)** Hydrolysis **(C)** Hydration **(D)** Hydrogenation

52. Anti-Markownikoff addition of HBr is not observed in

(A) propene **(B)** butene **(C)** 2-butene **(D)** 2-pentene

53. The addition of HCl in the presence of peroxide does not follow anti-Markownikoffs rule because

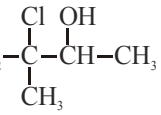
(A) HCl bond is too strong to be broken homolytically

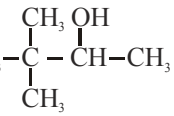
(B) Cl atom is not reactive enough to add on to a double bond

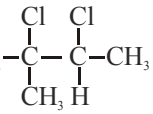
(C) Cl combines with H to give back HCl

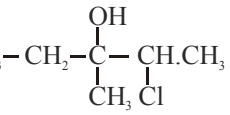
(D) HC is a reducing agent

54. 3-Methyl-2-penten on reaction with HOCl gives –

(A) 

(B) 

(C) 

(D) 

55. The addition of Br_2 to trans-2-butene produces

(A) (+) 2, 3-dibromobutane **(B)** (–) 2,3-dibromobutane

(C) rac-2,3-dibromobutane **(D)** meso-2,3-dibromobutane

56. $CH_2 = CH_2 \xrightarrow{Cl_2} A \xrightarrow{AgOH}$? the product is a –

(A) Glycol **(B)** Dial **(C)** Dioic acid **(D)** None of these

57. 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

58. Alkene $\xrightarrow{B_2H_5} \xrightarrow{H_2O_2/OH^-}$ 2° alcohol. The alkene would be –

(A) $CH_3 - CH = CH_2$ **(B)** $CH_3CH_2 - CH = CH_2$

(C) $(CH_3)_2C = CH_2$ **(D)** $CH_3 - CH = CH - CH_3$

59. Ethylene reacts with alkaline $KMnO_4$ to form –

(A) Oxalic acid **(B)** HCHO **(C)** Ethyl alcohol **(D)** Glycol

60. Which order is correct for bond length –

(A) $\equiv C - H > - C - H > = C - H$ **(B)** $- C - H < \equiv C - H < = C - H$

(C) $\equiv C - H <= C - H < - C - H$ **(D)** None of these

61. Which one of these will react with sodium metal –

(A) Ethyne **(B)** Ethene **(C)** Ethane **(D)** Ether

62. Ethyne adds on HCl to first give a –

(A) Carbanion **(B)** A free radical **(C)** A vinylic cation **(D)** A biradical

63. The relative acidity of ethyne, ethene and ethane follows the order –

(A) Ethane > Ethyne < Ethene **(B)** Ethyne > Ethene > Ethane

(C) Ethyne < Ethene < Ethane **(D)** Ethene < Ethane < Ethyne

64. Dichloro acetone can be prepared by the reaction

(A) $CH \equiv CH$ and HCl **(B)** $CH_3 - C \equiv CH$ and HOCl

(C) $CH_2 = CH - CH_3$ and HOCl **(D)** $CH_0CH_2CH = CH_2$ and HOCl

65. Ethene can be separated from ethyne by passing the mixture through

(A) concentrated H_2SO_4 **(B)** ammonical Cu_2Cl_2 **(C)** pyrogallol **(D)** charcoal powder

66. Acetylene on passing into excess of HOCl solution forms –

(A) Ethylene chlorohydrin **(B)** Acetaldehyde **(C)** Dichloroacetaldehyde **(D)** Methyl Chloride

67. Give the following reactions propyne + $HCl(g) \rightarrow A$

$A + HI\ (g) \rightarrow B$

The compound A and B are respectively :

(A) 1-chloropropene and 1-chloro-1-iodopropane **(B)** 1-chloropropene and 1-chloro-2-iodopropane

(C) 2-chloropropene and 2-chloro-2-iodopropane **(D)** 2-chloropropene and 1-iodo-2-iodopropane

68. Which of the following is most acidic ?

(A) Methane **(B)** Ethane **(C)** Ethylene **(D)** Acetylene

69. Acetylene reacts with ammonical silver nitrate to form –

(A) Silver mirror **(B)** Metallic silver **(C)** Silver acetate **(D)** Silver acetylide

70. The compounds 1-butyne and 2-butyne can be distinguished by using

(A) bromine water **(B)** $KMnO_4$ solution **(C)** Tollens reagent **(D)** chlorine gas

71. Lindlar's catalyst is :

(A) Na in liquid NH_3 **(B)** Pt in ethanol **(C)** Ni in ether **(D)** Pd with $BaSO_4$

72. 1-Butyne reacts with cold alkaline KMnO4 to produce

(A) CH_3CH_2COOH **(B)** $CH_3CH_2CH_2COOH$

(C) $CH_3CH_2COOH + CO_2$ **(D)** $CH_3CH_2COOH + HCOOH$

73. $CH_3 - C \equiv CH + H_2O \xrightarrow[Hg^{+2}]{H^+}$ 'A' Here is :

(A) Aldehyde **(B)** Ketone **(C)** Alkane **(D)** Alcohol

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

(A) acidic medium **(B)** alkaline medium **(C)** neutral medium **(D)** acid and $HgSO_4$

75. Distinction is pentene-1 and pentyne-1 is done by –

(A) $[Ag(NH_3)_2]^+$ **(B)** Conc. H_2SO_4 **(C)** HCl **(D)** Br_2

76. Which of the following reacts wisth metal by displacing H-atom?
(A) CH_4 **(B)** C_2H_6 **(C)** C_2H_4 **(D)** C_2H_2

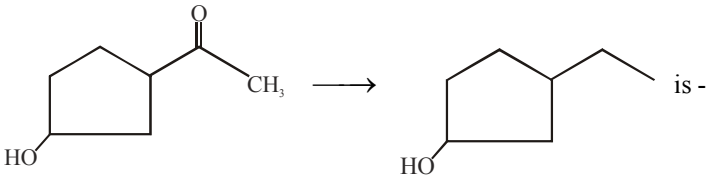
77. Acetylene when passed through 20% H_2SO_4 at 80°C givs acetaldehyde. The catalyst required for this conversion is
(A) Anhydrous $AlCl_3$ **(B)** $HgSO_4$ **(C)** Pd **(D)** Pt

78. Addition of HCN to ethyne in presence of $Ba(CN)_2$ as catalyst gives –
(A) 1, 1-dicyanoethane **(B)** Ethyl cyanide **(C)** Vinyl cyanide **(D)** Divinyl cyanide

79. A gas on passing through ammonical solution of $AgNO_3$ does not give any precipitate but decolourises alkaline $KMnO_4$ solution. The gas may be :
(A) C_2H_5 **(B)** C_2H_4 **(C)** C_3H_4 **(D)** C_3H_3

80. The smallest alkane which can show optical isomerism possesses –
(A) 5 carbons **(B)** 6 carbons **(C)** 7 carbons **(D)** 8 carbons

81. The appropriate reagent for the transformation.

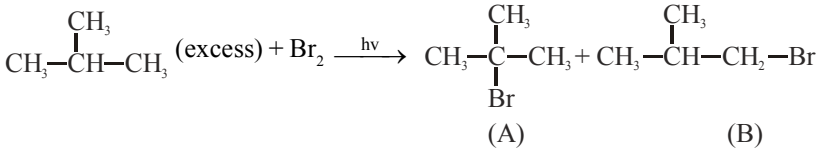


is -
(A) Zn(Hg)/HCl **(B)** NH_2NH_2, OH^- **(C)** H_2/Ni **(D)** $NaBH_4$

82. Propene is allowed to react with B_2D_6 and the product is treated with acetic acid. The final product obtained is –
(A) 1-deuteriopropane **(B)** 2-deuteriopropane **(C)** 1-deuteriopropene **(D)** 2-deuteriopropene

83. The least reactive alkane towards free-radical substitution reaction is –
(A) CH_4 **(B)** $(CH_3)_3CH$ **(C)** CH_3CH_3 **(D)** $CH_3CH_2CH_3$

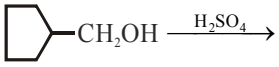
84. The relative reactivity of 1°H, 2°H and 3°H in bromination reaction has been found to be 1 : 82 : 1600 respectively. In the reaction –

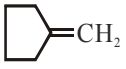


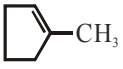
(A) (B)

the percentage yields of the products **(A)** and **(B)** are expected to be –
(A) 99.4%, 0.6% **(B)** 50%, 50% **(C)** 0.6%, 99.4% **(D)** 80%, 20%

85. For the reaction

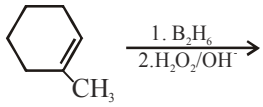


the major product is :
(A) 

(B) 

(C) 
(D) 

86. 1-Methylcyclohexene is allowed to react with B_2H_6. The product is then treated with H_2O_2 and NaOH. The reaction is –



The product formed is

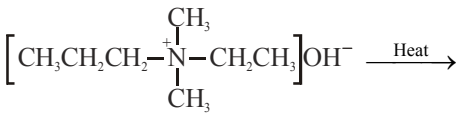
(A) 1-methylcyclohexanol **(B)** 2-methylcyclohexanol

(C) methylcyclohexane **(D)** cyclohexanol

87. The intermediate formed during the addition of HCl to propene in the presence of peroxide is –

(A) $CH_3\dot{C}HCH_2Cl$ **(B)** $CH_3CH_2\dot{C}H_2$ **(C)** $CH_3\overset{+}{C}HCH_3$ **(D)** $CH_3CH_2\overset{+}{C}H_2$

88. Consider the reaction



Which of the following is formed in major amount

(A) $CH_2=CH_2$ **(B)** $CH_3CH=CH_2$

(C) Both **(A)** and **(B)** in equal amount **(D)** None, as no reaction takes place

89. Propene on reaction with ICl produces mainly –

(A) 1-chloro-2-iodopropene **(B)** 2-chloro-1-iodopropane

(C) (±)-2-chloro-1-iodopropane **(D)** (±)-1-chloro-2-iodopropane

90. The major product obtained in the reaction of 1,3-Butadiene with HCl (1 mole) at a higher temperawtrue (100°C or above) is

(A) 3,4-0dichloro-1-butene **(B)** 3-chloro-1-butene

(C) 1-chloro-2-butene **(D)** 2-chloro-2butene

91. In the reaction

$$CH_3CH_2CH=CH_2 \xrightarrow[2.NaBD_4]{1.Hg(OAc)_2,H_2O}$$

the product obtained is –

(A) $CH_3CH_2CHOHCH_2D$ **(B)** $CH_3CH_2CHDCH_2OH$

(C) $CH_3CH_2CD(OH)CH_3$ **(D)** $CH_3CH_2CD_2CH_2OH$

92. In the additioin of HBr to propene in the absence ofa peroxide, the first step involves the addition of –

(A) H^+ **(B)** Br^- **(C)** $H^{\bullet}$ **(D)** $Br^{\bullet}$

93. The ease of formation of free radicals follows the order –

(A) $3° > 2° > 1° > \dot{C}H_3$ **(B)** $\dot{C}H_3 > 1° > 2° > 3°$

(C) $1° > 2° > 3° > \dot{C}H_3$ **(D)** $2° > 1° > 3° > \dot{C}H_3$

94. The addition of HCl to 1-phenylpropene gives –

(A) $C_6H_5CHClCH_2CH_3$ **(B)** $C_6H_5CH_2CHClCH_3$

(C) $C_6H_5CH_2CH_2CH_2Cl$ **(D)** $C_6H_5CH(CH_3)CH_2Cl$

95. An optically active hydrocarbon (X) on catalytic hydrogenation gives an optically inactive compound (Y), C_6H_{14}. The hydrocarbon (X) is –

(A) 3-methyl-1pentene **(B)** 3-methyl-2pentene

(C) 2-ethyl-1-butene **(D)** 3-methylcyclopentene

96. 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}

97. Which of the following has the lowest heat of hydrogenation per mole –

(A) cis-2-Butene **(B)** trans-2-Butene

(C) 1-Butene **(D)** 1,3-Butadiene

Exercise # 2 Part # I [Multiple Correct Choice Type Questions]

1. cis-2-Butene on reaction with Br_2 in CCl_4 produces mainly –

(A) 1-bromo-2-butene **(B)** 2,3-dibromobutane

(C) meso-2,3-dibromobutane **(D)** (±) 2, 3-dibromobutane

2. A hydrocarbon which decolourises $KMnO_4$ but does not give nay precipitate with ammoniated $AgNO_3$

(A) Benzene **(B)** Acetylene **(C)** Butyne **(D)** 2-Butene

3. Which reagent converts propene to 1-propanol

(A) H_2O, H_2SO_4 **(B)** B_2H_6, H_2O_2, OH^-

(C) $Hg(OAc)_2, NaBH_4/H_2O$ **(D)** Aq. KOH

4. Which of the following reactions will result in the formation of a chiral centre in the prodcut –

(A) $CH_3CH = CHCH_3 + HB_4 \longrightarrow$ **(B)** $CH_3CH=CH_2+HOBr \longrightarrow$

(C) $CH_3CH_2CH=CH_2 + HBr \longrightarrow$ **(D)** $CH_3CH_2CH=CH_2 + HBr \longrightarrow$

5. Propene on reaction with N-bromosuccinimide in CCl_4 produces –

(A) 1, 2-dibromopropane **(B)** 3-bromopropene

(C) 1-bromopropene **(D)** 2-bromopropene

6. Which one of the following alkenes will react faster with H_2 under catalytic hydrogenation conditions : [R = Alkyl Substituent]

(A)  **(B)**  **(C)**  **(D)** 

7. Which of the following decolourises alkaline $KMnO_4$ solution

(A) C_3H_5 **(B)** C_2H_4 **(C)** CH_4 **(D)** CCl_4

8. The bond dissociation energies of the following

CH_3-H CH_3CH_2-H $CH_2=CH-CH_2-H$ C_6H_5-H

I II III IV

vary in the order :

(A) I > II > III > IV **(B)** IV > III > II > I **(C)** IV > I > II > III **(D)** II > I > IV > III

9. Compounds capable of reacting with ammonical $AgNO_3$ solution are

(A) $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-C\equiv CH$ **(B)** $HC\equiv CH$ **(C)** 1-Butyne **(D)** all the above

10. Compound 'A' on chlorination gives compound 'B', compound 'B' reacts with alc. KOH gives gas 'C', which decolourises Baeyer reagent. ozonolysis of compound 'C' gives only HCHO compound. 'A' is :

(A) C_2H_6 **(B)** C_2H_4 **(C)** C_4H_{10} **(D)** C_2H_5Cl

11. Which of the following will react with sodium metal :

(A) Ethyne **(B)** 1-Butyne **(C)** 2-Butyne **(D)** Ethane

12. What are the products obtained upon the ozonolysis of 2-pentene?

(A) CH_3CH_2CHO **(B)** CH_3CHO **(C)** CH_3COCH_3 **(D)** $CH_3COCH_2CH_3$

13. 2-Bromo-3-phenylpropane can be synthesised by

(A) $C_6H_5CH_2CH(OH)CH_3 + PBr_3 \longrightarrow$

(B) $C_6H_4CH=CHCH_3 + HB_4 +$ benzoyl peroxide $\longrightarrow$

(C) $C_6H_5CH_2CH_2CH_3 + Br_2 +$ light $\longrightarrow$

(D) none of these

14. Arrange the following in order of increase/decrease in boiling point.

$CH_3CH_2CH_2CH_2CH_3$ (I) $\quad (CH_3)_2CHCH_2CH_3$ (II) $\quad (CH_3)_4C$ (III)

(A) I > II > III **(B)** II > I > III **(C)** III > I > II **(D)** III < II < I

15. Which of the following can be used for the preparation of propane?

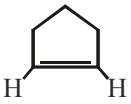
(A) $CH_3CH=CH_2 \xrightarrow[2.\ CH_3COOH]{1.\ B_2H_6}$ **(B)** $CH_3CH_2CH_2Cl \xrightarrow[2.\ H_2O]{1.Mg/ether}$

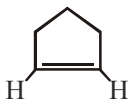
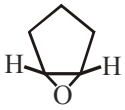
(C) $CH_3CH_2CH_2I \xrightarrow{Red\ P/HI/150°C}$ **(D)** $CH_3CH_2CH_2COONa \xrightarrow[\Delta]{NaOH/CaO}$

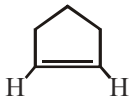
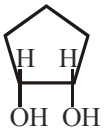
16. The nitration of propane with concentrated HNO_3 gives :

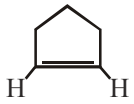
(A) $CH_3CH_2CH_2NO_2$ **(B)** $CH_3CH(NO_2)CH_3$ **(C)** $CH_3CH_2NO_2$ **(D)** CH_3NO_2

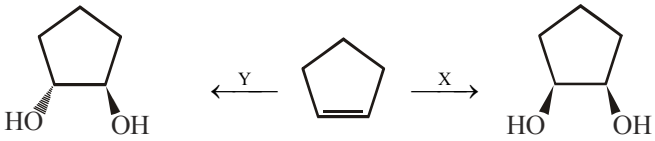
17. Which of the following are correct :

(A)  $\xrightarrow[2.\ Zn,H_2O]{1.\ O_3}$ $OHC-CH_2CH_2CH_2-CHO$

(B)  $\xrightarrow[CH_2Cl_2]{C_6H_5C(=O)-OOH}$ 

(C)  $\xrightarrow[\text{cold dilute solution}]{KMnO_4}$ 

(D)  $\xrightarrow[OH^-,\ heat]{KMnO_4}$ $^-O-C(=O)CH_2CH_2CH_2C(=O)-O^-$

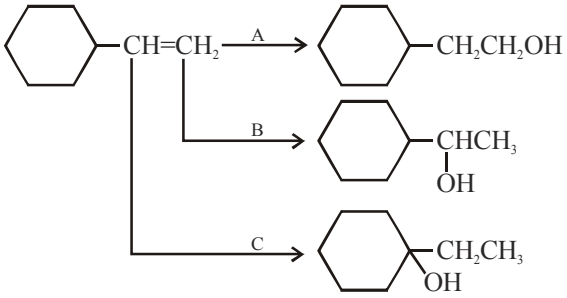
18. 

Select X and Y out of :

1 : MnO_4^-/OH^- II : HCO_3H

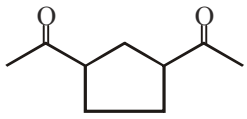
(A) X -I, Y-II **(B)** X -II, Y -I **(C)** X - I, Y -I **(D)** X -II, Y -II

19.

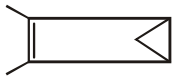


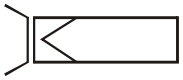
A, B and C are :
(A) simple hydration
(B) hydroboronation, mercuration-demercuration, hydration
(C) hydration, hydroboronation, mercuration-demercuration
(D) merccuratin-demercuration, hydration, hydroboronation

20. $C_9H_{14} \xrightarrow{\text{ozonolysis}}$ **(A)**



Hence A is :

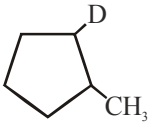
(A) 

(B) 

(C) 

(D) 

21. 1-Methylcyclopentene can be converted into the given compound



by the use of which of the following reagents ?

(A) BD_3 followed by HCOOH

(B) BH_3 followed HCOOD

(C) BD_3 followed by HCOOD

(D) BH_3 followed $CH_3-\overset{\overset{O}{\|}}{C}-O-D$

22. Which of the following is the chain termination step during photochlorination of ethane :

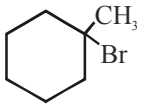
(A) $CH_3-\dot{C}H_2+\dot{C}l \longrightarrow CH_3-CH_2-Cl$

(B) $CH_3-\dot{C}H_2+\dot{C}H_3 \longrightarrow CH_3CH_2CH_2CH_3$

(C) $\dot{C}l+\dot{C}l \longrightarrow Cl_2$

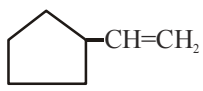
(D) $\dot{C}l+\dot{H} \longrightarrow HCl$

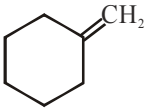
23. In the given reaction

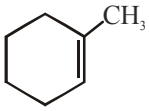
C_7H1_2 **(A)** $\xrightarrow{HBr}$ 

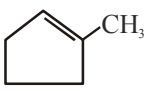
as major product

(A) is :

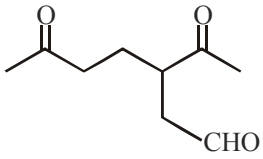
(A) 

(B) 

(C) 

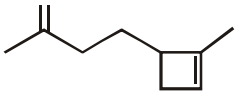
(D) 

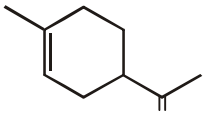
24. The reactions that lead to product **(a)** and **(b)** on ozonolysis are

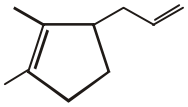


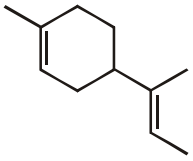
HCHO

(a) **(b)**

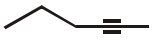
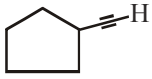
(A) 

(B) 

(C) 

(D) 

25. $HgSO_4/H_2SO_4$ and $B_2H_6/NaOH\ H_2O_2$ will give same major product, when react with which of the following.

(A) $O_2N-C\equiv CH$ **(B)**  **(C)**  **(D)** 

26. Methane will be produced in which of the following reaction :

(A) $Be_2C \xrightarrow{HIO}$ **(B)** $CH_3OH \xrightarrow{LAH}$

(C) $CH_3-Cl \xrightarrow[EtOH]{Na}$ **(D)** $Al_4C_3 \xrightarrow{H_2O}$

27. Which of the following will decolourise bromine water

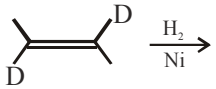
(A) $CH_2=CH_2$ **(B)** $HC=CH$ **(C)**  **(D)** 

28. Select correct statement :

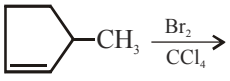
(A) Methane cannot be prepared by catalytic hydrogenation of alkene

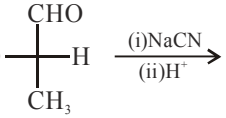
(B) Al isomers of the formula C_6H_{14} can be prepared by catalytic hydrogenation of alkene

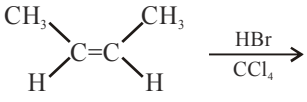
(C) All isomers of the formula C_5H_{12} can be prepared by catalytic hydrogenation of alkene

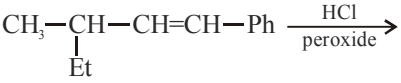
(D)  product obtained show no optical rotation

29. Which of following reaction product is Diastereomer.

(A) 

(B) 

(C) 

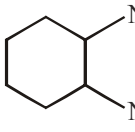
(D) 

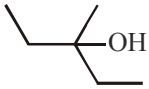
30. Which of the following produce aromatic product.

(A) $Me-C\equiv CH \xrightarrow[\text{Fe tube}]{\text{Red hot}}$

(B) $C_6H_{14} \xrightarrow[Cr_2O_3,\ \Delta]{Al_2O_3}$

(C)  $\xrightarrow[KOH]{CHCl_3}$

(D)  $+$  $\longrightarrow$

31. $X \xrightarrow{H_3O^{\ominus}}$  $\xrightarrow{H^{\oplus}}$ Y (major)

X & Y may relate with each other as

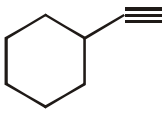
(A) Chain isomers **(B)** Position isomers

(C) Geometrical isomers **(D)** Identical

32. Which of the following reacts with grignard reagent to give alkane.

(A) nitro ethane **(B)** acetyl acetone **(C)** acetaldehyde **(D)** acetone

33. Which of the following will not produce same product when treated with dilH_2SO_4 with $HgSO_4$ or when udergo hydroboration oxidation?

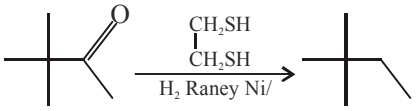
(A) 

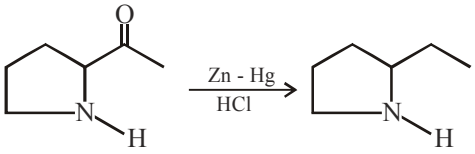
(B) 

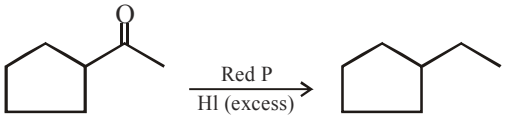
(C) 

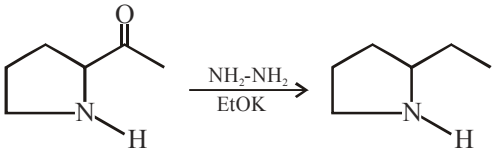
(D) 

34. Which of the following represent correct product formation.

(A) 

(B) 

(C) 

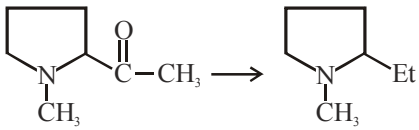
(D) 

35. 1-Pentyne reacts with :

(A) Sodium **(B)** Sodamide

(C) Ammonical silver nitrate **(D)** Ammonical cuprous chloride

36. Suitable reagent(s) to carry out following conversion is/are



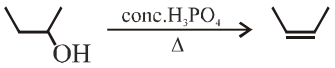
(A) $\begin{matrix}CH_2-SH\\ |\\ CH_2-SH\end{matrix}$ /H_2/Ni followed by $OH^{\ominus}$

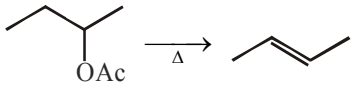
(B) N_2H_4/H_2O_2

(C) N_2H_4 / EtONa

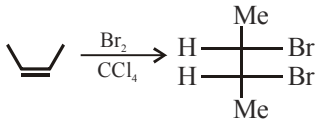
(D) Zn / Hg / HCl

37. Select option(s) in which incorrect major product is shwon :

(A) 

(B) 

(C) $Ph-CH_2-\underset{\oplus NEt_3}{CH}-CH_3 \xrightarrow[\Delta]{OH^{\ominus}} Ph-CH=CH-Me$

(D) 

38. $Me_2C=CH_2 \xrightarrow[\Delta]{conc.H_2SO_4} \underset{(major)}{A} \xrightarrow{H^+/KMnO_4} B \xrightarrow{NaOH} C \xrightarrow[CaO,]{NaOH}$ Product.

Incorrect about the product.

(A) It gives two monochloro products

(B) Two isolated dibromides are theoretically possible

(C) Product is liquid at room temperature

(D) It can be form by Wurtz reaction in good yield.

39. Grignard reagent gie alkane with :

(A) C_2H_5OH **(B)** $C_2H_5NH_2$ **(C)** H_2O **(D)** None of these

Part # II [Assertion & Reason Type Questions]

These questions contains, Statement-I (assertion) and Statement - II (reason).

(A) Statement-I is True, Statement-II is True ; Statement-II is a correct explanation for Statement-I.

(B) Statement- I is True, Statement-II is True ; Statement-II is NOT a correct explanation for Statement-I.

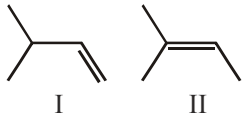
(C) Statement-I is True, Statement-II is False.

(D) Statement-I is False, Statement-II is True.

1. **Statement - I :** Buta-1,3-diene is less stable than Penta-1, 4-diene.
Statement - II : Buta-1, 3-diene has greater number of resonating structrures and delocalised electron cloud.

2. **Statement-I :** Neopentane forms only one monochlorinated prodcut.
Statement-II : Neopentane has four identical methyl group attached to a quaternary carbon.

3. Statement - I : Alkynes are more reactive than alkanes towards electrophilic reagents like H^+.
Statement-II : The alkyl carbocation formed from alkene is more stable than the vinyl carbocation formed from alkyne.

4. **Statement-I** : Of two isomeric alkenes shown, 
I II is more stable I .

Statement-II : The alkene (I) has sp^2- hybridized carbons.

5. **Statement-I** : Addition of HBr to 1-butene gives two optical isomers.
Statement-II : The product contains one asymmetric carbon.

6. **Statement-I** : 1-Butene on reaction with HBr in the presence of a peroxide produces 1-bromobutane.
Statement-II : It involves the formation of a primary radical.

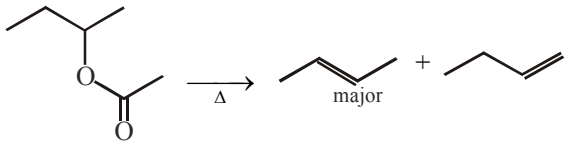
7. **Statement - I** : Propene is more reactive than ethane with HCl.
Statement - II : Propene is more stable than thane.

8. **Statement - I** : Addition of Br_2^- water containing dissolved NaCl to ethylene gives a mixture of 1, 2-dibromoethane, 1-bromo-2-chloroethane and 2-bromoethanol.
Statement - II : Addition occurs through a carbocation intermediate.

9. **Statement-I** : Addition of bromine to trans-2-butene yields meso-2,3-dibromobutane.
Because
Statement-II : Bromine addition to an alkene is an electrophilic addition.

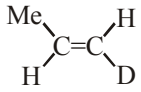
10. **Statement-I** : Iodination of alkanes is carried out in the presence of iodic acid.
Statement-II : Iodic acid removes I_2 gas from the reaction mixture.

11. **Statement-I** :



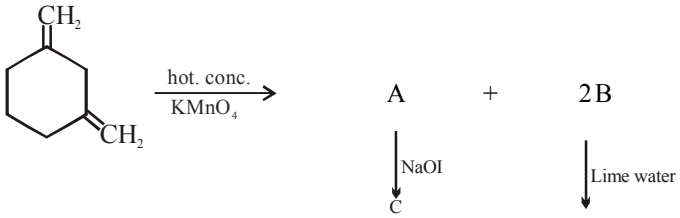
Statement - II : 2-buttene is more stable than 1-butene as it is having more α – H.

12. **Statement-I** : $Me-C\equiv C-D \xrightarrow[liq.\ NH_3]{Na}$



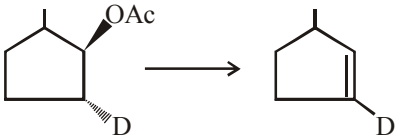
Statment-II : Birch reduction is anti addition.

13.



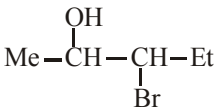
Statement - I : "C" product of above conversion is sodium salt of Pentan-1,5-dioic acid.
Statement - II : R.D.S. of A→ C conversion is attack of enolate ion on Halogen molecule.

14. **Statement - I** : Product of pyrolysis of



Statement - II : C – H bond is weaker than C – D bond.

15. **Statement-I** : $Me-CH=CH-Et \xrightarrow{Br_2} Me-\underset{\oplus}{\underset{Br}{CH}}-CH-Et \xrightarrow{H_2O}$



Major product

In above reaction sequence Non classical carbocation opens from the side of –Me group.
Statement-II : Me exert less steric hindrance than –Et group.

Exercise # 3 Part # I [Matrix Match Type Questions]

1. Match the coumn I with column II.

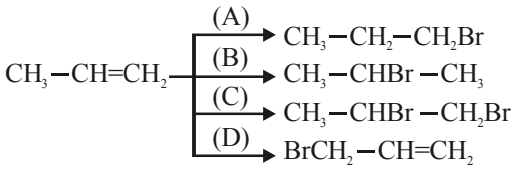
Column - I		Column - II	
(A)	Wurtz reaction	(p)	Electrophilic substitution reaction
(B)	Hydration of alkenes	(q)	Free radical susbtitution
(C)	Nitration of alkane	(r)	Electrophilic addition reaction
(D)	Reaction of alkene with NBS	(s)	Nucleophilic substitution

2. Match the column I with column II .

Column - I		Column - II	
(A)	Dehydrohalogenation of alkyl halides	(p)	Kolbe reaction
(B)	Electrolysis of sodium salt	(q)	Alc. KOH
(C)	Ozonolysis	(r)	Addition product of ethylene
(D)	Dichloro ethylene	(s)	Sodalime
(E)	Decarboxylation	(t)	Alkene

3. Match the column I with column II .

Column - I

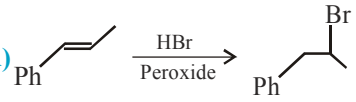
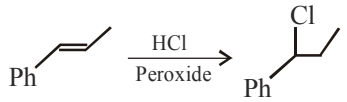
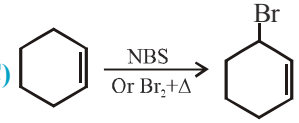
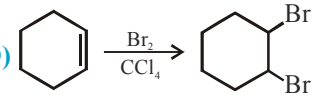


Column - II	
(p)	HBr
(q)	HBr + peroxide
(r)	NBS
(s)	Br_2, low temp., dark

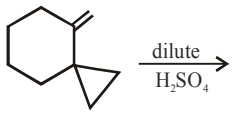
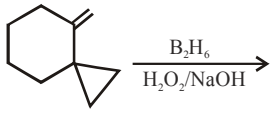
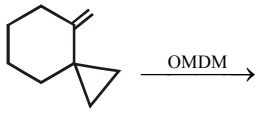
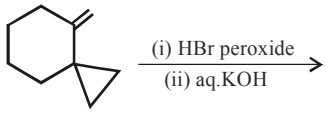
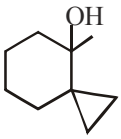
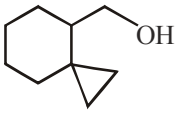
4.

Column I		Column - II	
(A)	1-Phenylbut-1-yne $\xrightarrow[Hg^{+2}]{Dil\ H_2SO_4}$	(p)	1-phenylbutan-1-one
(B)	1-Phenylbut-1-yne $\xrightarrow[(2)\ H_2O_2+\bar{O}H]{(1)\ BH_3+THF}$	(q)	1-Phenylbutan-2-one
(C)	But-2-ene (cis) $\xrightarrow{Br_2+CCl_4}$	(r)	Syn addition
(D)	But-2-ene (trans) $\xrightarrow{Br_2+CCl_4}$	(s)	Antiaddition
		(t)	Optically inactive

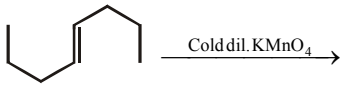
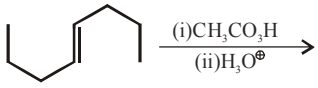
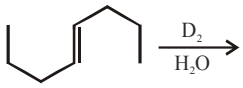
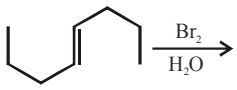
5.

Column I (Reactant)	(Major Product)	Column - II (Intermediate involve)	
(A)		(p)	Free Radical
(B)		(q)	Carbanion
(C)		(r)	Carbocation
(D)		(s)	Two isomers are formed

6. Match the column :

Column I		Column - II	
(A)		**(p)**	Over all reaction involves Markowinkof's addition of water molecule on alkene.
(B)		**(q)**	Over all reaction involves Anti-Markownikof's addition of water molecule on alkene.
(C)		**(r)**	Reaction involves carbocation rearrangement.
(D)		**(s)**	 is major product
		(t)	 is major product

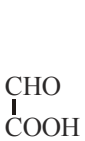
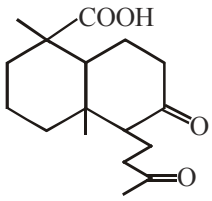
7. Match the column :

Column I		Column - II	
(A)		**(p)**	Optically inactive dur to internal compensation
(B)		**(q)**	Optically inactive dur to external compensation
(C)		**(r)**	Product presence of two chiral center
(D)		**(s)**	Diastereomers will be formed.

Part # II [Comprehension Type Questions]

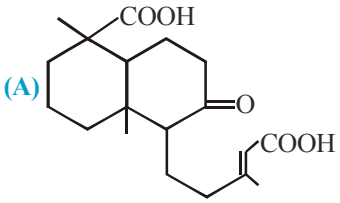
Comprehension # 1

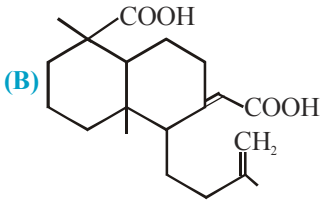
Ozonolysis of a compound Agathene dicarboxylic acid gives following compounds.

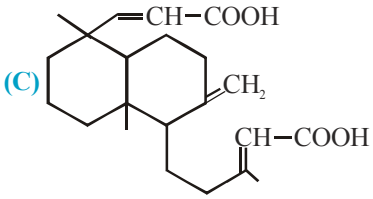
HCHO,  & 

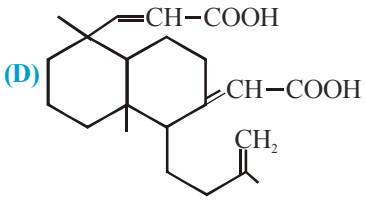
On complete reduction by Na-EtOH Agathene dicarboxylic acid give hydrocarbon $C_{20}H_{38}$ which have 5 chiral carbon in it.

1. The struture of Agathene dicarboxylci acid is

(A) 

(B) 

(C) 

(D) 

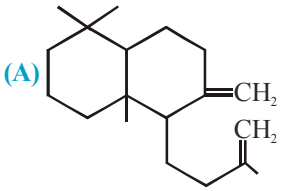
2. How many chiral carbon are present in Agathene dicarboxylic acid :

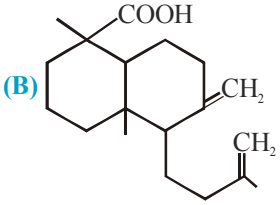
(A) 2 **(B)** 3 **(C)** 4 **(D)** 5

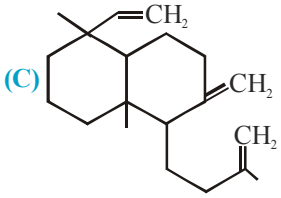
3. Total stereoisomers possible for Agathene dicarboxylic acid are :

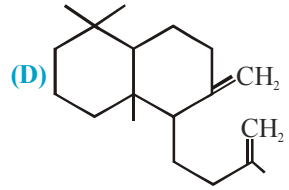
(A) 16 **(B)** 18 **(C)** 32 **(D)** 64

4. Structrue of product formed when Agathene dicarboxylic acid is heated with soda lime is :

(A) 

(B) 

(C) 

(D) 

5. True statement about Agathene dicarboxylic acid is :

(A) it gives ppt. with Tollen's reagent

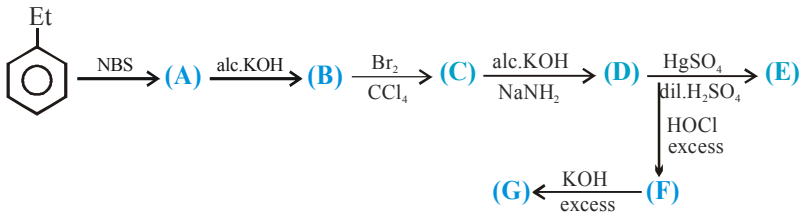
(B) it gives red colour with 2,4-dinitrophenyl hydrazine

(C) it gives off effervescence of $\overset{12}{C}O_2$ with $NaH\overset{14}{C}O_3$

(D) none of the above

Comprehension # 2

Dr. Sandy Robertson worked out following reaction sequenec.



1. Select true statement**(s)** :

(A) when D is treated with D_2 Pd $BaSO_4$ it gives alkene

(B) when D is treated with Na liq. ND_3 it gives trans alkene.

(C) both

(D) none

2. True about E is :

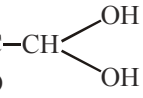
(A) It gives positive Fehling test.

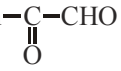
(B) It does not give positive test with Braddy's reagent

(C) It gives positive IOdoform test

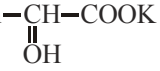
(D) It gives effervescence with $NaHCO_3$

3. G is :

(A) 

(B) 

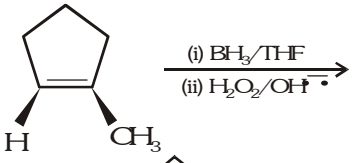
(C) 

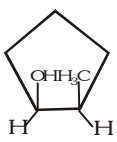
(D) 

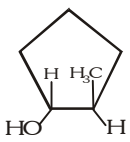
Comprehension # 3

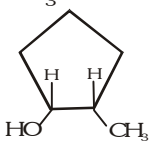
Borane is an electron deficient compound. It has only six valence electrons, so the boron atom lacks an octet. Acquiring an octet is the driving force for the unusual bonding structure found in boron compounds. As an electron deficient compound, BH_3 is a strong electrophile, capable of adding to a double bond. This hydroboration of double bond is though to occur in one step, with the boron atom adding to the less highly substituted end of the double bond. In transition state, the boron atom withdraws electrons from the pi bond and the carbon at the other end of the double bond acquires a partial positive charge. This positive charge is more stable on the more highly substituted carbon atom. The second step is the oxidation of boron atom, removing it from carbon and replacing it with a hydroxyl group by using H_2O_2/OH^-.

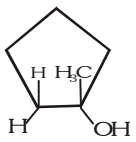
The simultaneous addition of boron and hydrogen to the double bond leads to a syn addition. Oxidation of the trialkyl borane replaces boron with a hydroxyl group in the same stereochemical position. Thus, hydroboration of alkene is an example of stereospecific reaction, in which different stereoisomers of starting compounds react to give different stereoisomers of the product.

1. What will be the product of following reaction  product :

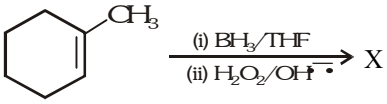
(A) 

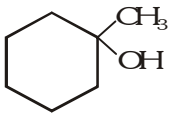
(B) 

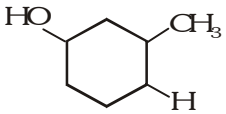
(C) 

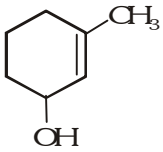
(D) 

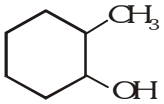
2. Find the product of following reaction

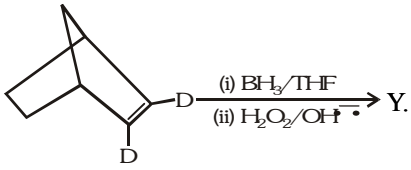


(A) 

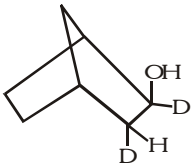
(B) 

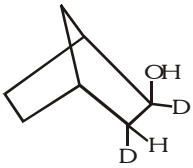
(C) 

(D) 

3. 

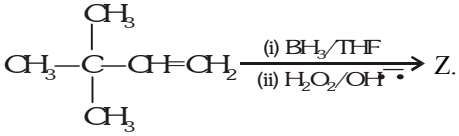
Y is :

(A) Meso 

(B) Racemic 

(C) both

(D) None of these

4. 

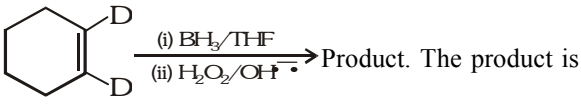
Z is :

(A) Optically active 1°-alcohol

(B) Optically active 2°-alcohol

(C) Optically inactive 1°-alcohol

(D) Optically inactive 3°-alcohol

5. 

(A) Threo cyclic alcohol

(B) Erythreo cyclic alcohol

(C) Optically active alcohol

(D) Both **(B)** and **(C)**

Comprehension # 4

$X(C_4H_9Br) \xrightarrow{alc.KOH} Y \xrightarrow{Br_2} Z\ (Dibromide) \xrightarrow{NaNH_2} W\ (gas) \xrightarrow[Sol^n]{AgNO_3}$ white ppt. X, Y and Z are

1.

	X	Y	Z
(A)	$CH_3—CH_2CH_2CH_2Br$	$CH_3—CH=CH—CH_3$	$CH_3—\underset{Br}{CH}—CH_2—\underset{Br}{CH_2}$
(B)	$CH_3—CH_2CH_2CH_2Br$	$CH_3—CH_2—CH=CH_2$	$CH_3—CH_2—\underset{Br}{CH}—\underset{Br}{CH_2}$
(C)	$CH_3—CH_2—CH_2—CH_3$	$CH_3—CH=CH—CH_3$	$CH_3—\underset{Br}{CH}—\underset{Br}{CH}—CH_3$
(D)	$CH_3—CH_2—\underset{Br}{CH}—CH_3$	$CH_3—CH=CH—CH_3$	$CH_3—CH_2—\underset{Br}{CH}—\underset{Br}{CH_2}$

2. Reductive ozonolysis of Y yields :

(A) 2 moles of CH_3CHO **(B)** CH_3CH_2CHO & HCHO

(C) $CH_3—\underset{\underset{O}{\|}}{C}—CH_3$ & HCHO **(D)** CH_3CH_2COOH & HCOOH

3. Which of the following statement (s) is/are correct :

(A) Compound W has 2 DU

(B) Y & W are functional isomers

(C) W can be converted into Y with Lindlar catalyst

(D) W can be converted into Y with Ni/Pt

Comprehension # 5

Hydrocarbon **(A)** C_6H_{10} on treatment with H_2/Ni, H_2/Lindlar's catalyst or Na/liq. NH_3 forms three different reduction products **(B)**, **(C)**, **(D)** respectively. **(A)** does not form any salt with ammonical $AgNO_3$ solution, but **(E)** forms salt on heating with $NaNH_2$ in an inert solvent. Compound **(E)** reacts with CH_3I to give (F). Compound **(D)** on oxidative ozonolysis gives n-butanoic acid along with other product.

1. **(D)** and **(C)** are

(A) Isomeric alkane **(B)** Isomeric alkene

(C) Not isomers **(D)** **(C)** is an alkene and **(D)** is salt

2. If **(E)** is reacted with acetaldehyde followed by acidification, product is

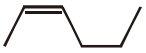
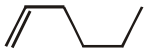
(A) acid **(B)** ketone **(C)** ether **(D)** alcohol

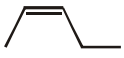
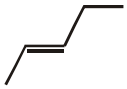
3. (F) on ozonolysis will produce -

(A) acetic aicd **(B)** formic acid **(C)** propanoic acid **(D)** formaldehyde

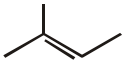
Exercise # 4 [Subjective Type Questions]

1. Select one from the following pair of isomer that has higher heat of combustion, justifying your choice.

(a)  (I) and  (II)

(b)  (I) and  (II)

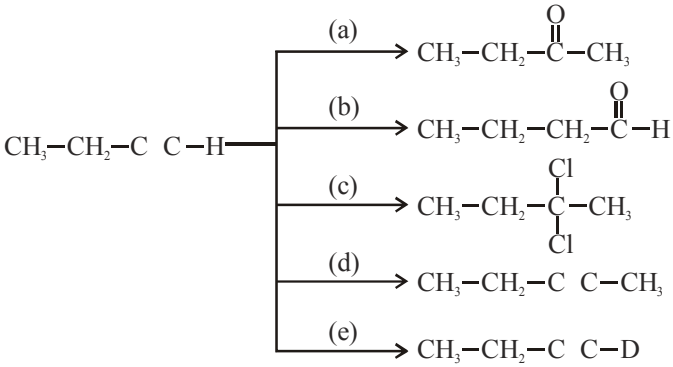
(c)  (I) and  (II)

(d)  (I) and  (II)

2. Why n-Pentane has higher boiling point than neopentane?

3. A hydrocarbon (A) was found to have vapour 36. It forms only single mono chlorosubstitution product.

4. Find out reagents involved in following conversions :



5. Write major product in the following reactions :

(a) $F_3C-CH=CH_2+HI \longrightarrow$

(b) $C_6H_5-CH=CHCH_3+HBr \xrightarrow{\text{Peroxide}}$

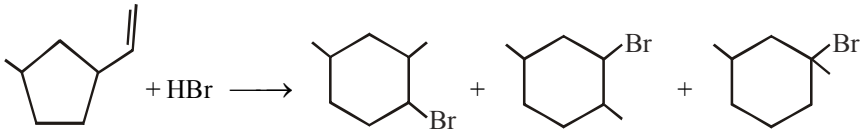
(c) $CH_3CH=\underset{\displaystyle CH_3}{\overset{|}{C}}-CH_3 + CHBr_3 \xrightarrow{\text{Peroxide}}$

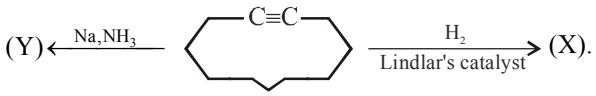
(d) $C_6H_5-CH=CH_2+B_2H_6 \xrightarrow[NaOH]{H_2O_2}$

(e) $CH_3-CH=CH-CH=CH_2 \xrightarrow[50°C]{HCl}$

6. An olefin was treated with ozone and the resulting product on reductive hydrolysis gave 2-pentanone and acetaldehyde. What is the structure of olefin ? Write reactions.

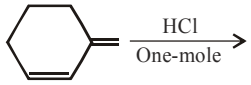
7. Propose mechanism :



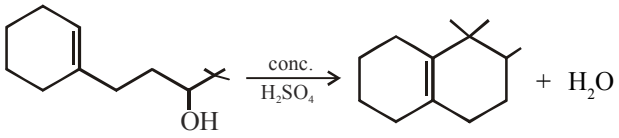
8. 

What are X and Y in above reaction .

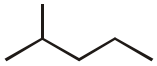
9. The reaction of the diene shown below with dry HCl can lead to four products. Provide structural formula of all the products.

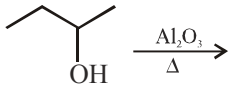


10. Write a plausible mechanism for the following transformation.



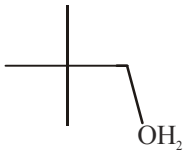
11. (a) How many alkene on catalytic reduction will produce

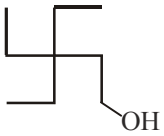


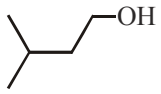
(b) 

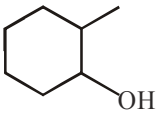
Total number of alkene produced

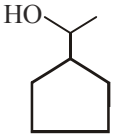
12. How many alcohols out of following on dehydration with hot conc. H_2SO_4 will give alkene having 9 α H as major product.

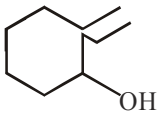
(a) 

(b) 

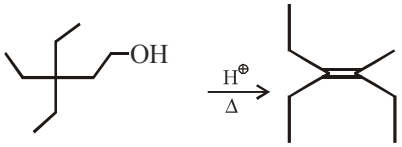
(c) 

(d) 

(e) 

(f) 

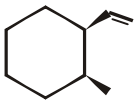
13. (a) How many 1,2-shifts are involed.

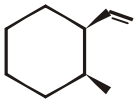


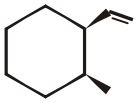
(b) 

Number of α – H in major product.

14. Propane reacts with chlorine in sunlight to give two products. 1-chloropropane is obtained in 44% yield and 2-chloropropane is obtained 56% yield of the total product. What will be the precent yield of the major product obtained when butane is treated with Cl_2 similar conditions.

15.  $\xrightarrow[(A)]{OMDM}$ Major product

 $\xrightarrow[(B)]{HBO}$ Major product

 $\xrightarrow[(C)]{dil.H_2SO_4}$ Major product

(a) Number of stereoisomers possible for reactant (P).
(b) Number of stereoisomers formed during reaction (A) as major product (Q).
(c) Number of stereoisomers formed during reaction (B) as major product (R).
(d) Number of stereoisomers formed during reaction (C) as major products (S).

16. X $\xrightarrow[Ni]{2H_2}$ 

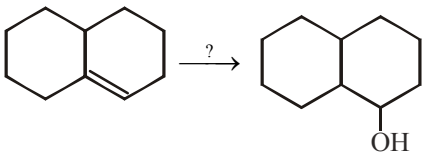
(a) Number of 'X' which can show geometrical isomerism.
(b) Number of 'X' which can show optical isomerism.

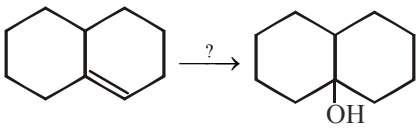
17.  $\xrightarrow[NaOH,H_2O]{OsO_4}$

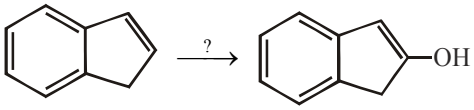
(a) Number of organic product formed during this reaction.
(b) Number of stereoisomers possible for major organic product of this reaction are.
(c) Oxidation state of Os before reaction.
(d) Oxidation stawte of Os after reaction.

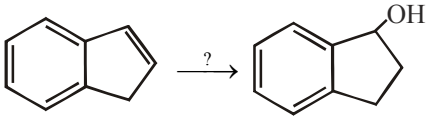
18. Explain why iso octane is less viscous than n-octane.

19. Which reagent are suitable for following transformation?

(a) 

(b) 

(c) 

(d) 

20. How many alkene on catalytic reduction give normal butane as product.

(i) (A) $\xrightarrow{H_2/Pt}$ n-butane (ii) (B) $\xrightarrow{H_2/Pt}$ Iso-pentane

(iii) (C) $\xrightarrow{H_2/Pt}$ Neo-pentane (iv) (D) $\xrightarrow{H_2/Pt}$ Cyclopentane

(v) (E) $\xrightarrow[Pt]{H_2}$ 

21. Match each of the following isomer with the correct boiling point and melting point. Explain your choice.

Compound : 2,2,3,3-tetramethyl butane and n-octane

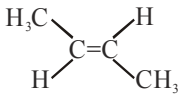
Boiling point : 106.5°C, 125.7°C

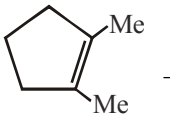
Melting point : –56.8°C, + 100.7°C

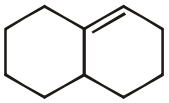
22. Give the expected major product for each reaction, including stereochemistry where applicable.

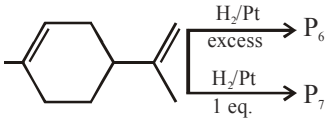
(a) $CH_3 - CH_2 - CH = CH_2 \xrightarrow[Pt]{H_2} P_1$

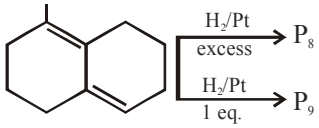
(b)  $\xrightarrow[Pt]{D_2} P_2$

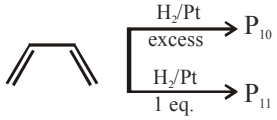
(c)  $\xrightarrow[Ni]{D_2} P_3$

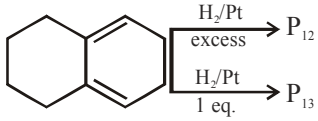
(d)  $\xrightarrow{Ni/H_2} P_4$

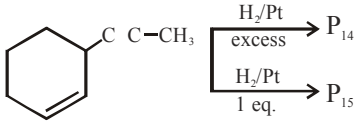
(e)  $\xrightarrow[Pt]{H_2}$

(f) 

(g) 

(h) 

(i) 

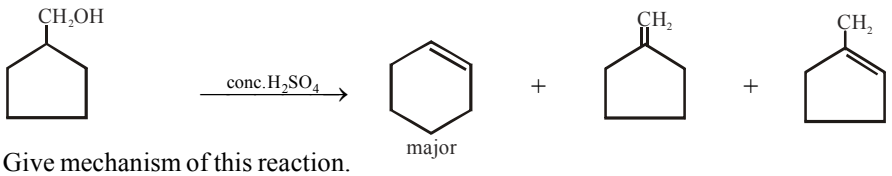
(j) 

23. Write one reagent in each case to make distinction between

(a) 1-butyne and 2-butyne ..... (b) 1-butene and 1-butyne .....

(c) ethene and ehane .....

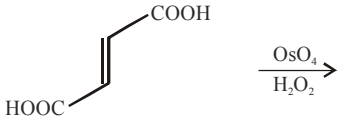
24. A hydrocarbon A($C_{10}H_{12}$) has no chiral carbon. A gives a white precipitate with ammonical solution of silver nitrate. A on treatment with H_2/Pt gives B($_{10}H_{20}$). A on ozonolysis gives C($C_8H_{12}O_4$) as one product which on heating with soda lime gives D(C_6H_{12}). D on monochlorination with Cl_2/hv gives $C_6H_{11}Cl$ as sole isomer. Identify A to D.

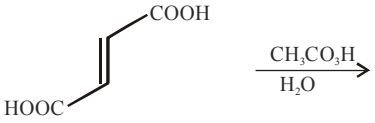
25. 

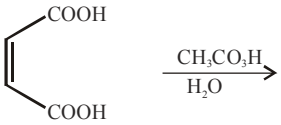
major

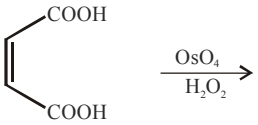
Give mechanism of this reaction.

26. Identify the products in the following, giving their configurations. (if any)

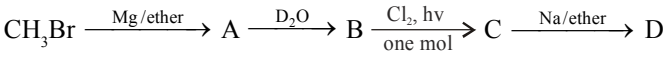
(a) 

(b) 

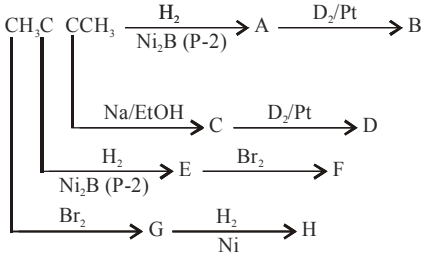
(c) 

(d) 

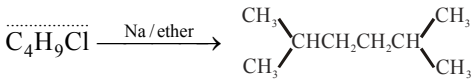
27. Idenfity A to D in the following scheme.



28. 2-Butyne undergoes following reactions in steps as indicated. Idenfity A to H.



29. C_5H_{10} represents three isomeric alkenes A_1, A_2 and A_3. Each on hydrogenation gives 2-methylbutane. A_1 and A_2 on oxymercuration-demercuration give the same 3° alcohol. A_2 and A_3 on hydroboration oxidation give different 1° alcohol. Assign structure to A_1, A_2 and A_3 explain the reaction.

30. 

Write structure of C_4H_9Cl.

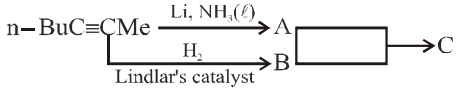
31. Specity the reagents in which addition to alkene is syn or anti

(i) Br_2 water (ii) H_2/pd

(iii) MnO_4^-/OH^- (iv) HCO_3H

(v) MCPBA (vi) OsO_4 in ether, followed by $\overline{OH}/H_2O$

32. Identify A, B, C with proper explanation.



Exercise # 5 Part # I [Previous Year Questions] [AIEEE/JEE-MAIN]

1. Which one of the following is reduced with Zn–Hg/HCl to give the corresponding hydrocarbon. **[AIEEE-2004]**
(A) Butan-2-one **(B)** Acetic acid **(C)** Acetamide **(D)** Ethyl acetate

2. Which one of the following has the minimum boiling point : **[AIEEE-2004]**
(A) isobutane **(B)** 1-butyne **(C)** 1-butene **(D)** n-butane

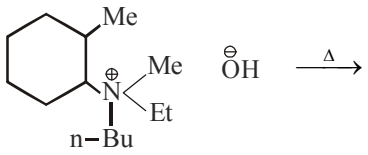
3. 2-Methylbutane on reacting with bromine in the presence of sunlight gives mainly **[AIEEE-2005]**
(A) 2-bromo-2-methylbutane **(B)** 1-bromo-2-methylbutane
(C) 1-bromo-3-methylbutane **(D)** 2-bromo-3-methylbutane

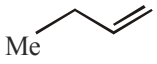
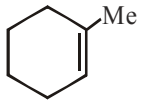
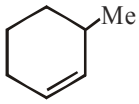
4. Alkyl halides react with dialkyl copper reagent to give **[AIEEE-2005]**
(A) alkyl copper halides **(B)** alkenes
(C) alkenyl halides **(D)** alkanes

5. Reaction of one molecule of HBr with one molecule of 1,3-butadiene at 40°C gives predominantly **[AIEEE-2005]**
(A) 1-bromo-2-butene under thermodynamically controlled conditions
(B) 3-bromobutene under kinetically controlled conditions
(C) 1-bromo-2-butene under kinetically controlled conditions
(D) 3-bromobutene under thermodynamically controlled conditions

6. Acid catalyzed hydration of alkenes except ethene leads to the formation of **[AIEEE-2005]**
(A) secondary or tertiary alcohol
(B) primary alcohol
(C) mixture of secondary and tertiary alcohols
(D) mixture of primary and secondary alcohols

7. Elimination of bromine from 2-bromobutane results in the formation of **[AIEEE-2006]**
(A) predominantly 2-butene **(B)** equimolar mixture of 1 and 2-butene
(C) predominantly 2-butyne **(D)** predominantly 1-butene

8.  **[AIEEE-2006]**

The alkene formed as a major product in the above elimination reaction is –
(A)  **(B)** $CH_2=CH_2$ **(C)**  **(D)** 

9. Reaction of trans-2-phenyl-1-bromocyclo pentane on reaction with alcoholic KOH produces– **[AIEEE-2007]**
(A) 4-phenyl cyclopentene **(B)** 2-phenyl cyclopentene
(C) 1-phenyl cyclopentene **(D)** 3-phenyl cyclopentene

10. Phenyl magnesium bromide reacts with methanol to give– **[AIEEE-2007]**
(A) A mixture of anisole 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

11. Which of the following reactions will yield, 2,2-dibromopropane **[AIEEE-2008]**
(A) $CH_3-C\equiv CH + 2HBr$ **(B)** $CH_3CH=CHBr + HBr \longrightarrow$
(C) $CH\equiv CH + 2HBr \longrightarrow$ **(D)** $CH_3-CH=CH_2 + HBr \longrightarrow$

12. In the following sequence of reactions, the alkene affords the compound 'B' is – **[AIEEE-2009]**

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

The compound B is –

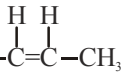
(A) CH_3CH_2CHO **(B)** CH_3COCH_3 **(C)** $CH_3CH_2CHCH_3$ **(D)** CH_3CHO

13. The hydrocarbon which can react with sodium in liquid ammonia is **[AIEEE-2009]**

(A) $CH_3CH_2CH_2C\equiv CCH_2CH_2CH_3$ **(B)** $CH_3CH_2C\equiv CH$

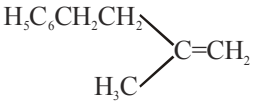
(C) $CH_3CH=CHCH_3$ **(D)** $CH_3CH_2C\equiv CCH_2CH_3$

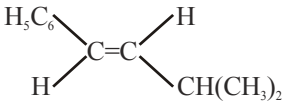
14. The treatment of CH_3MgX with $CH_3C\equiv C-H$ produces **[AIEEE-2011]**

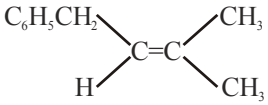
(A) $CH_3-CH=CH_2$ **(B)** $CH_3C\equiv C-CH_3$ **(C)**  **(D)** CH_4

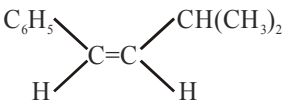
15. The main product of the following reaction is **[AIEEE-2011]**

$C_6H_5CH_2CH(OH)CH(CH_3)_2 \xrightarrow{Conc.H_2SO_4} ?$

(A) 

(B) 

(B) 

(D) 

16. One mole of a symetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is – **[AIEEE-2012]**

(A) ethene **(B)** propene **(C)** 1-butene **(D)** 2-butene

17. Ozonolysis of an organic compound gives formaldehyde as one of the products. This confirms the presenceof :- **[JEE-Main 2013]**

(A) an isopropyl groups **(B)** an acetylenic triple bond

(C) two ethylenic double bonds **(D)** a vinyl group

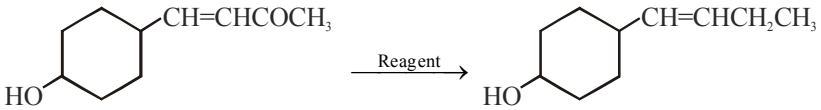
18. Ozonolysis of an organic gives formaldehyde as one of the products. This confirms the presence of : - 'A' from the following compounds :- **[JEE-Main 2015]**

(A) 2-Methyl-1-pentene **(B)** 1-Pentene **(C)** 2-Pentene **(D)** 2-Methyl-2-pentene

19. 2-Hexyne gives trans-2-Hexne on treatment with – **[JEE-Main 2015]**

(A) $LiAlH_4$ **(B)** Pt/H_2 **(C)** Li/NH_3 **(D)** $Pd/BaSO_4$

20. In the given tranformation, which of the following is the most appropriates reagent ? **[JEE-Main 2015]**

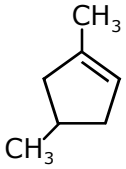


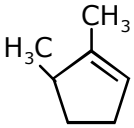
(A) $NaBH_4$ **(B)** $NH_2NH_2, \overset{\ominus}{O}H$ **(C)** $Zn-Hg/HCl$ **(D)** $Na, Liq.NH_3$

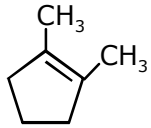
21. The major organic compound formed by the reaction of 1, 1, 1– trichloroethane with silver powder is : **[JEE - Main 2014]**

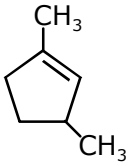
(A) 2-Butyne **(B)** 2-Butene **(C)** Acetylene **(D)** Ethene

22. Which compound would give 5 - keto - 2 - methyl hexanal upon ozonolysis? **[JEE - Main 2015]**

(A) 

(B) 

(C) 

(D) 

23. The trans - alkenes are formed by the reduction of alkynes with : **[JEE - Main 2018]**

(A) $NaBH_4$ **(B)** Na/ Liq. NH_3 **(C)** Sn - HCI **(D)** H_2 - Pd/C, $BaSO_4$

Part # II [Previous Year Questions][IIT-JEE ADVANCED]

1. 2-hexyne can be converted into trans-2-hexene by the reaction of – **[IIT-2004]**

(A) H_2–Pd–$BaSO_4$ **(B)** Li in Liquid NH_3 **(C)** H_2–PtO_2 **(D)** $NaBH_4$

2. 1-Bromo-3-chloro cyclobutane on reaction with 2-equivalent of sodium in ether gives – **[IIT-2005]**

(A)  **(B)**  **(C)**  **(D)** 

3. HCHO and $CH_3-\overset{O}{\overset{\|}{C}}-\overset{O}{\overset{\|}{C}}-H$ are the products obtained on ozonolysis of a monomer **(A)** of a polymer.

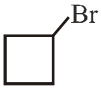
(a) Give the structure of **(A)** **[IIT-2005]**

(b) Draw the all '"cis" form of a polymer of a monomer **(A)**

4. When Phenyl Magnesium Bromide reacts with tert. butanol, which of the following is formed? **[IIT-2005]**

(A) Tert. butyl methyl ether **(B)** Benzene **(C)** Tert. butyl benzene **(D)** Phenol

5. 1-bromo-3-chlorocyclobutane when treated with two equvalents of Na, in the presence of ether which of the following will be formed? **[IIT-2005]**

(A)  **(B)**  **(C)**  **(D)** 

6. $CH_3-CH=CH_2 + NOCl \rightarrow P$ **[IIT-2006]**

Identify the adduct.

(A) $CH_3-\underset{Cl}{CH}-\underset{NO}{CH_2}$ **(B)** $CH_3-\underset{NO}{CH}-\underset{Cl}{CH_2}$ **(C)** $CH_3-CH_2-\overset{NO}{\underset{Cl}{CH}}$ **(D)** $\underset{NO}{CH_2}-CH_2-\underset{Cl}{CH_2}$

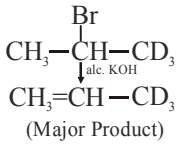
7. $CH_3-CH=CH_2 \xrightarrow{NOCl}$ Product, product is : **[IIT-2006]**

(A) $CH_3-\underset{Cl}{CH}-CH_2-NO$ **(B)** $CH_3-\underset{NO}{CH}-CH_2-Cl$

(C) $CH_3-CH_2-CH_2-Cl$ **(D)** $NO-CH_2-CH_2-CH_2-Cl$

8. Match the following : **[IIT-2006]**

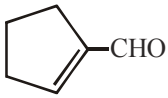
(A)	$Ph-CH_2-CH_2-Br$ & $Ph\text{-}CD_2-CH_2Br$ reacts with the same rate.	**(p)**	E^1 reaction
(B)	$Ph-\underset{Br}{CH}-CH_3$ reacts faster than $Ph-\underset{Br}{CH}-CD_3$	**(q)**	E^2 reaction
(C)	$Ph-CH_2-CH_2-Br \xrightarrow[C_2H_5OD/C_2H_5O^-]{}$ $Ph-CD=CH_2$	**(r)**	E_{cb}^1 reaction

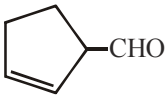
(D) 

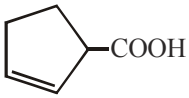
(Major Product)

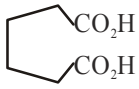
(s) I[st] order reaction

9. 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 : **[IIT-2007]**

(A) 

(B) 

(C) 

(D) 

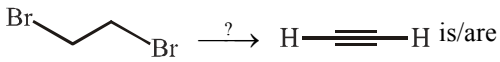
10. The number of stereoisomers obtained by bromination of trans-2-butene is **[IIT-2007]**

(A) 1 **(B)** 2 **(C)** 3 **(D)** 4

11. The number of structural isomers for C_6H_{14} is – **[IIT-2007]**

(A) 3 **(B)** 4 **(C)** 5 **(D)** 6

12. The reagent(s) for the followign conversion, **[IIT-2007]**



is/are

(A) alcoholic KOH **(B)** alcoholic KOH followed by $NaNH_2$

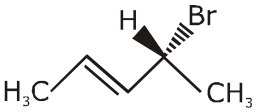
(C) aquesou KOH folled by $NaNH_2$ **(D)** Zn / CH_3OH

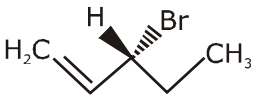
13. The synthesis of 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and an alkyne. The bromoalkane and alkyne respectively are **[IIT-2010]**

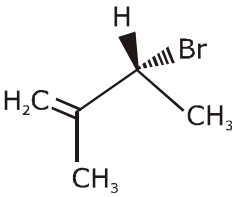
(A) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3CH_2C{\equiv}CH$ **(B)** $BrCH_2CH_2CH_3$ and $CH_3CH_2CH_2C{\equiv}CH$

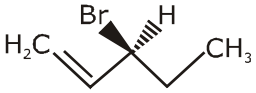
(C) $BrCH_2CH_2CH_2CH_2CH_3$ and $CH_3C{\equiv}CH$ **(D)** $BrCH_2CH_2CH_2CH_3$ and $CH_3CH_2C{\equiv}CH$

14. Compound(s) that on hydrogenation produce(s) optically inactive compound(s) is(are) **[IIT-2015]**

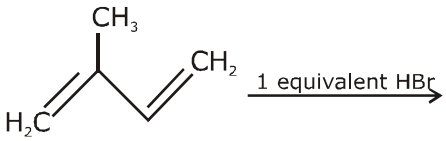
(A) 

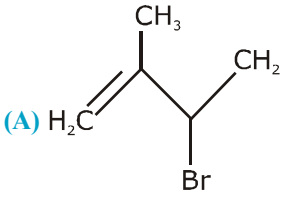
(B) 

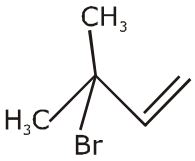
(C) 

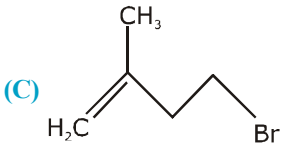
(D) 

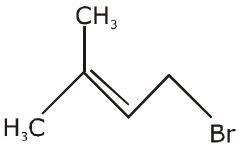
15. In the following reaction, the major product is : **[IIT-2015]**



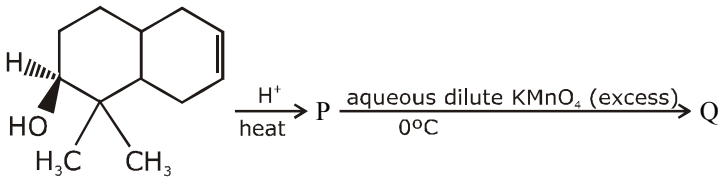
(A) 

(B) 

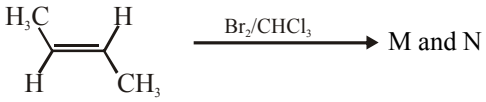
(C) 

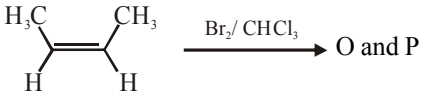
(D) 

16. The number of hydroxyl group(s) in **Q** is **[IIT-2016]**



17. The correct statement(s) for the following addition reactions is(are) **[IIT-2017]**

(i) 

(ii) 

(A) (M and O) and (N and P) are two pairs of enantiomers

(B) Bromination proceeds through trans-addition in both the reactions

(C) O and P are identical molecules

(D) (M and O) and (N and P) are two pairs of diastereomers

MOCK TEST

SECTION - I : STRAIGHT OBJECTIVE TYPE

1. Successive alkanes differ by

(A) CH_2 **(B)** CH **(C)** CH_3 **(D)** C_2H_4

2. Which of the following compounds will form a hydrocarbon on reaction with a Grignard reagent ?

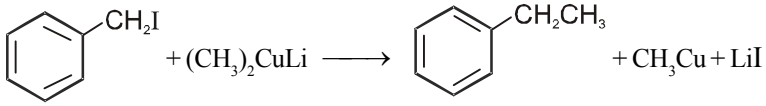
(D) CH_3CH_2OH **(B)** CH_3CHO **(C)** CH_3COCH_3 **(D)** $CH_3CO_2CH_3$.

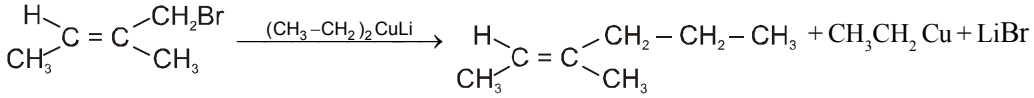
3. A mixture of two organic compound was treated with sodium metal in ether solution. Isobutane was obtained as product. The two chlorine compounds are

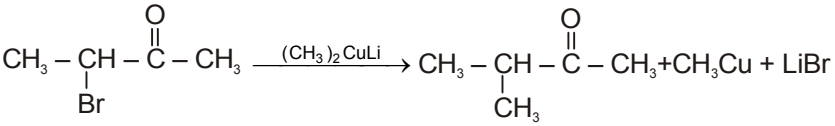
(A) Methyl chloride and propyl chloride **(B)** Methyl chloride and ethyl chloride

(C) Isopropyl chloride and Methyl chloride **(D)** Isopropyl chloride and ethyl chloride

4. Which of the following reaction is correct ?

(A) 

(B) 

(C) 

(D) All of these

5. During chlorination of methane to methyl chloride, the propagation step is represented by

(A) $Cl-Cl \xrightarrow{h\nu} \dot{Cl} + \dot{Cl}$ **(B)** $\dot{C}H_3 + \dot{Cl} \longrightarrow CH_3Cl$

(C) $CH_4 + \dot{Cl} \longrightarrow \dot{C}H_3 + HCl$ **(D)** $\dot{Cl} + \dot{Cl} \longrightarrow Cl-Cl$

6. A gaseous hydrocarbon 'X' on reaction with bromine in light forms a mixture of two monobromo alkanes and HBr. The hydrocarbon 'X' is :

(A) CH_3–CH_3 **(B)**  **(C)**  **(D)** 

7. When two alkenes may be formed by dehydrohalogenation of an alkyl halide, the alkene which is more substituted is the major or preferred product. This generalisation is known as

(A) Markownikoff's rule **(B)** Anti-Markownikoff's rule

(C) Saytzeff rule **(D)** None of these is correct.

8. Ethyne can be prepared in a single step from

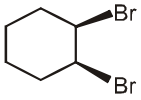
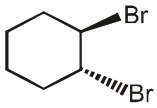
(A) Calcium carbide **(B)** Ethylidene bromide **(C)** Ethylene bromide **(D)** All of these.

9. The correct order of alkene reactivity towards an electrophile is mentioned in-

(A) $CH_2=CH-Cl > CH_2=CH-OCH_3$ **(B)** $CH_2=CHCl < CH_2=CCl_2$

(C) ethene > propene **(D)** $CH_2=CH-OCH_3 > CH_2=CH-\underset{\underset{OH}{|}}{CH_2}$

10.  $+ Br_2 \longrightarrow$ P, P will have configuration :

(A)  **(B)**  **(C)** both true **(D)** none is true

11. $Ph-CH_2-CH=CH_2 \xrightarrow{\text{dil. } H_2SO_4} X,$

Identify product 'X' is :

(A) $Ph-CH_2-CH_2-CH_2-OH$ **(B)** $Ph-\underset{\underset{H}{|}}{\overset{\overset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{OH}{|}}{C}}-CH_3$

(C) $Ph-\underset{\underset{OH}{|}}{\overset{\overset{H}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-CH_3$ **(D)** $Ph-CH_2-OH$

12. When HBr adds to 1-butene in the presence of benzoyl peroxide, the products is

(A) 1-Bromobutane **(B)** 2-Bromobutane **(C)** 1-Bromobutene **(D)** 2-Bromobutene.

13. $A \xleftarrow[HgSO_4 / H_2O]{H_2SO_4} H-C\equiv C-CH_2-CH_3 \xrightarrow[H_2O_2,\ OH^{\ominus}]{B_2H_6 / T.H.F.} B$

A & B are :

(A) Positional isomers **(B)** Functional isomers **(C)** Metamers **(D)** Homologs

14. $CH_2=CH-CH=CH_2$

$\xrightarrow{HI\ /-80^{\circ}C}$ $H_2C=CH-\underset{\underset{I}{|}}{CH}-CH_3$ .....(1)

$\xrightarrow{HI\ /+30^{\circ}C}$ $H_2C-\underset{\underset{I}{|}}{CH}=CH-CH_3$ .....(2)

At given temperature, these reaction tell about control of reaction which is :

	(1)	(2)
(A)	Kinetic	Thermodynamic
(B)	Thermodynamic	Kinetic
(C)	Kinetic	Kinetic
(D)	Thermodynamic	Thermodynamic

SECTION - II : MULTIPLE CORRECT ANSWER TYPE

15. The correct products have been reported in reactions.

(A) $CH_2=CH-CHO \xrightarrow{HCl(g)(-10^\circ C)} \underset{Cl}{CH_2-CH_2}-CHO$

(B) $CH_2=CH-COOH \xrightarrow{H_2O/H_2SO_4} \underset{OH}{CH_2-CH_2}-COOH$

(C) $CH_3-\underset{\underset{O}{\|}}{\overset{CH_3}{\overset{|}{C}}}=CH-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{CH_3OH/H_2SO_4} CH_3-\underset{\underset{OCH_3}{|}}{CH}-\underset{\underset{O}{\|}}{\overset{CH_3}{\overset{|}{CH}}}-C-CH_3$

(D) $CH_3-CH=CH-OCH_3 \xrightarrow{CH_3OH/H^+} CH_3-CH_2-\underset{\underset{OCH_3}{|}}{CH}-OCH_3$

16. Which of following will react with But-1-yne ?

(A) $AgNO_3+NH_4OH$ **(B)** $Cu_2Cl_2+NH_4OH$ **(C)** Na **(D)** $KMnO_4$/KOH cold

17. Acetone (CH_3COCH_3) is the major product in :

I $CH_2=C=CH_2 \xrightarrow{H_3O^\oplus}$

II $CH_3C\equiv CH \xrightarrow{H_2SO_4\ /\ HgSO_4\ /\ H_2O}$

III $CH_3C\equiv CH \xrightarrow[H_2O_2\ /\ OH^\ominus]{BH_3.THF}$

(A) I **(B)** II **(C)** III **(D)** none

SECTION - III : ASSERTION AND REASON TYPE

18. **Statement-1 :** When double and triple bonds are in conjugation, addition takes place at triple bond.
Statement-2 : When double and triple bond are not in the conjugation, addition takes place at double bond

19. **Statement-1 :** $CH_3-CHBrCH_3 \xrightarrow[\Delta]{alcoKOH} CH_3-CH=CH_2 \xrightarrow{BrCl} CH_3CHCl\,CH_2Br$

Statement-2 : In above reaction product formed, is based on the principle of E2 & electrophilic addition reaction by markownikov's rule.

20. **Statements-1 :** Reaction of HCl with But-2-ene in the presence or absence of peroxide will give same products.
Statement-2 : Above reaction is regioselective reaction.

21. **Statement-1 :** Addition of bromine to trans-2-butene yields meso-2. 3-dibromobutane.
Statement-2 : Bromine addition to an alkene is an electrophilic addition

SECTION - IV : COMPREHENSION TYPE

Read the following comprehensions carefully and answer the questions.

Comprehension # 1

$$X(C_4H_9Br) \xrightarrow{\text{alc. KOH}} Y \xrightarrow{Br_2} Z\ (\text{Dibromide}) \xrightarrow{NaNH_2} W\ (\text{gas}) \xrightarrow[\text{Solution}]{AgNO_3} \text{White ppt}$$

22. X, Y and Z are :

	X	Y	Z
(A)	$CH_3-CH_2CH_2CH_2Br$	$CH_3-CH=CH-CH_3$	$CH_3-\underset{\underset{Br}{|}}{CH}-CH_2-\underset{\underset{Br}{|}}{CH}$
(B)	$CH_3-CH_2CH_2CH_2Br$	$CH_3-CH_2-CH=CH_2$	$CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-\underset{\underset{Br}{|}}{CH_2}$
(C)	$CH_3-\underset{\underset{Br}{|}}{CH}-CH_2-CH_3$	$CH_3-CH=CH-CH_3$	$CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-\underset{\underset{Br}{|}}{CH_2}$
(D)	$CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-CH_3$	$CH_3-CH_2-CH=CH_2$	$CH_3-CH_2-\underset{\underset{Br}{|}}{CH}-\underset{\underset{Br}{|}}{CH}$

23. Reductive ozonolysis of Y yields

(A) 2 moles of CH_3CHO **(B)** CH_3CH_2CHO & HCHO

(C) $CH_3-\underset{\underset{O}{||}}{C}-CH_3$ & HCHO **(D)** CH_3CH_2COOH & HCOOH

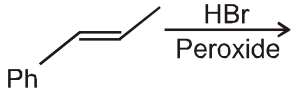
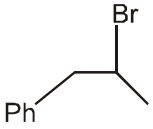
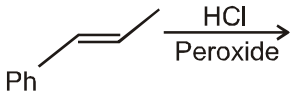
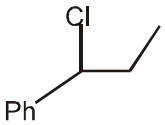
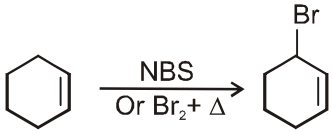
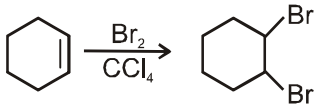
24. Which of the following statement is correct

(A) Y and W distinguish by bromine water test **(B)** Y & W are functional isomers

(C) W can be converted into Y with Lindlar's catalyst **(D)** W can be converted into Y with H_2/Pt

SECTION - V : MATRIX - MATCH TYPE

25.

Column-I (Reactions) (Reactant)	(Major Product)	Column-II (Intermediate involve)
(A) 		**(p)** Free Radical
(B) 		**(q)** Carbanion
(C) 		**(r)** Carbocation
(D) 		**(s)** Two isomers are formed

SECTION - VI : SUBJECTIVE TYPE

26. **Convert the following molecule in given product :**

a. $CH_3CH_2CH_2CH_2I$ to $CH_3CH_2CH_2CH_2Br$

b. Cyclohexyl acetylene to ethylcyclohexylacetylene.

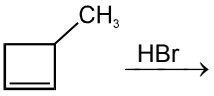
c. CH≡CH to **(A)** 2-butanone and **(B)** butanal

d. Cyclohexane to cyclohexene and 1,3-cyclohexadiene

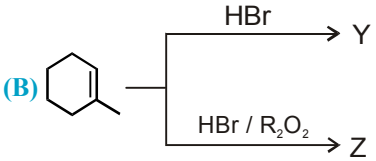
e. 2-bromobutane to cis and trans-2-butene

f. 1-Butyne to **(A)** 1-butanol and **(B)** 2-butanol

g. 1-butene to 1,3-butadiene

27. **(A)** 

(X)

(B) 

Identify X, Y and Z.

ANSWER KEY

EXERCISE - 1

1. B	**2.** B	**3.** A	**4.** A	**5.** A	**6.** A	**7.** C	**8.** B	**9.** D	**10.** C	**11.** C	**12.** A	**13.** C
14. B	**15.** B	**16.** D	**17.** C	**18.** D	**19.** A	**20.** C	**21.** A	**22.** C	**23.** C	**24.** B	**25.** C	**26.** B
27. B	**28.** B	**29.** A	**30.** A	**31.** D	**32.** B	**33.** A	**34.** A	**35.** B	**36.** D	**37.** B	**38.** A	**39.** B
40. A	**41.** C	**42.** A	**43.** A	**44.** C	**45.** A	**46.** C	**47.** B	**48.** B	**49.** D	**50.** B	**51.** D	**52.** C
53. A	**54.** D	**55.** D	**56.** A	**57.** D	**58.** D	**59.** D	**60.** C	**61.** A	**62.** C	**63.** B	**64.** B	**65.** B
66. C	**67.** C	**68.** D	**69.** D	**70.** C	**71.** D	**72.** C	**73.** B	**74.** D	**75.** A	**76.** D	**77.** B	**78.** C
79. B	**80.** C	**81.** B	**82.** B	**83.** A	**84.** A	**85.** C	**86.** B	**87.** C	**88.** A	**89.** B	**90.** C	**91.** A
92. A	**93.** A	**94.** A	**95.** A	**96.** B	**97.** D							

EXERCISE - 2 : PART # I

1.	D	**2.**	D	**3.**	B	**4.**	A, B, D
5.	B	**6.**	B	**7.**	B	**8.**	C
9.	D	**10.**	A	**11.**	A, B	**12.**	A, B
13.	A, B	**14.**	A, D	**15.**	A,B, C	**16.**	A, B, C, D
17.	A, B, C, D	**18.**	A	**19.**	B	**20.**	B
21.	B, D	**22.**	A, B, C	**23.**	A, B, C	**24.**	A, B, C
25.	A, B, C	**26.**	A, C, D	**27.**	A, B	**28.**	A, B, D
29.	A, B, D	**30.**	A, B, C	**31.**	A, B, C, D	**32.**	A, B
33.	A, B, C	**34.**	A, C, D	**35.**	A, B, C, D	**36.**	A, C
37.	A, B, D	**38.**	A, B, C, D	**39.**	A, B, C		

PART # II

1. D	**2.** A	**3.** D	**4.** C	**5.** A	**6.** C	**7.** B	**8.** A	**9.** B	**10.** C	**11.** D	**12.** D	**13.** C
14. B	**15.** B											

EXERCISE - 3 : PART # I

1.	A → (s), B → (r), C → (p), D → (q)	**2.**	A → (q), B → (p), C → (t), D → (r), D → (s)
3.	A → (q), B → (p), C → (s), D → (r)	**4.**	A → (p, t), B → (q, t), C → (s, t), D → (s, t)
5.	A → (p, s), B → (r, s), C → (p, s), D → (s)	**6.**	A → (p, r), B → (q, t), C → (p, s), D → (q, t)
7.	A → (q, r), B → (p, r), C → (q, r), D → (q, r)		

PART # II

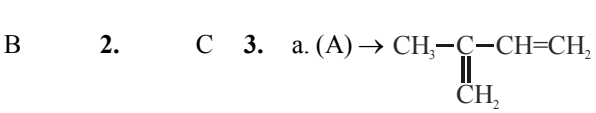
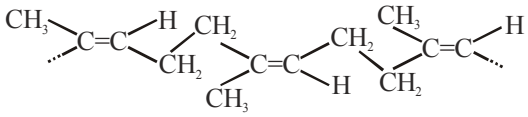
Comprehension # 1 :	**1.** A	**2.** C	**3.** C	**4.** A	**5.** D				
Comprehension # 2 :	**1.** A	**2.** C	**3.** D						
Comprehension # 3 :	**1.** B	**2.** D	**3.** B	**4.** C	**5.** D				
Comprehension # 4 :	**1.** B	**2.** B	**3.** A, C						
Comprehension # 5 :	**1.** B	**2.** D	**3.** A						

EXERCISE - 5 : PART # I

1. A **2.** A **3.** A **4.** D **5.** A **6.** A **7.** A **8.** B **9.** D **10.** B **11.** A **12.** D **13.** B

14. D **15.** B **16.** D **17.** D **18.** D **19.** C **20.** B **21.** A **22.** D **23.** B

PART # II

1. B **2.** C **3.** a. (A) →  b. 

4. B **5.** D **6.** A **7.** A **9.** B **10.** A **11.** C
12. B **13.** D **14.** B, D **15.** D **16.** 4 **17.** B, D

MOCK TEST

1.	A	**2.**	D	**3.**	C	**4.**	D	**5.**	C
6.	C	**7.**	C	**8.**	D	**9.**	D	**10.**	B
11.	C	**12.**	A	**13.**	B	**14.**	A		
15.	A, B, D	**16.**	A, B, C, D	**17.**	A, B	**18.**	B	**19.**	A
20.	C	**21.**	B	**22.**	B	**23.**	B	**24.**	C

25. A → (p,s), B → (r, s), C → (p,s), D → (s)