

UNIT : 21 HYDROCARBONS

Important Points

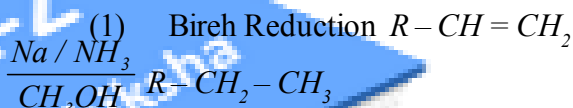
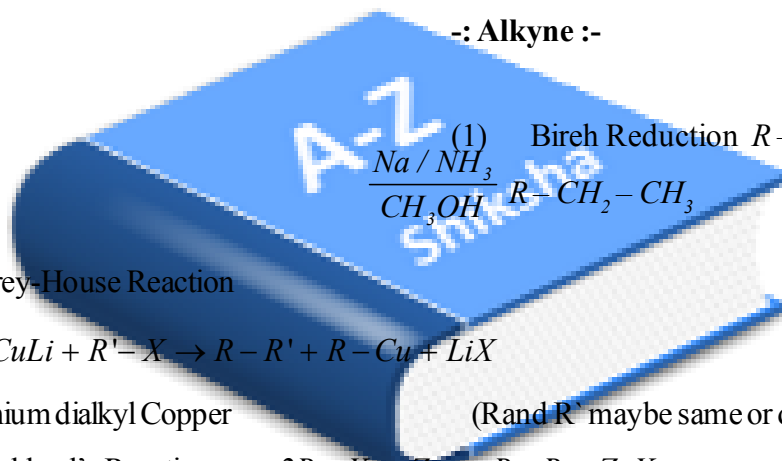
- Organic Compounds Containing Only Carbon and hydrogen are Called **hydrocarbons**. These are Classified as follows

Hydrocarbons			
Alkane	Alkene	Alkyne	Arene
C_nH_{2n+2}	C_nH_{2n}	C_nH_{2n-2}	C_nH_{2n-6}
C - C	C = C	C ≡ C	Alternate
Saturated	Unsaturated	Unsaturated	C - C and C = C

Missing Points :-

In this Hydrocarbon unit following points are in the syllabus of JEE Book. So prepare following points.

:- Alkyne :-



- (2) Corey-House Reaction

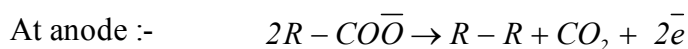


Lithium dialkyl Copper

(R and R' maybe same or different)

- (3) Frankland's Reaction:- $2R-X + Zn \rightarrow R-R + ZnX_2$

- (4) Kolbe's Electrolysis:- $R-COONa \rightarrow R-COO^- + Na^+$



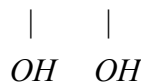
- (5) Pyrolysis or Cracking :- $C_3H_8 \xrightarrow{\Delta} CH_2=CH_2 + CH_4$

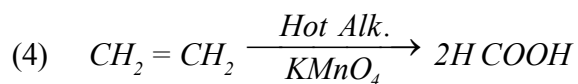
:- Alkenes :-

- (1) $2R-CHX_2 + 2Zn \rightarrow R-CH=CH-R + ZnX_2$

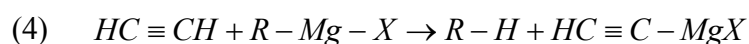
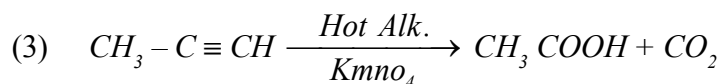
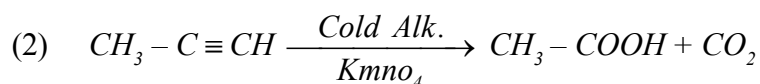
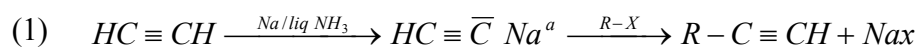
- (2) $CH_2=CH_2 + H_2O \xrightarrow[\text{Hydration}]{H_2SO_4 / HgSO_4} CH_3CH_2OH$

- (3) Baeyer's Test :- $CH_2=CH_2 \xrightarrow{KMnO_4} CH_2-CH_2$



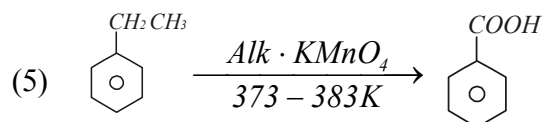
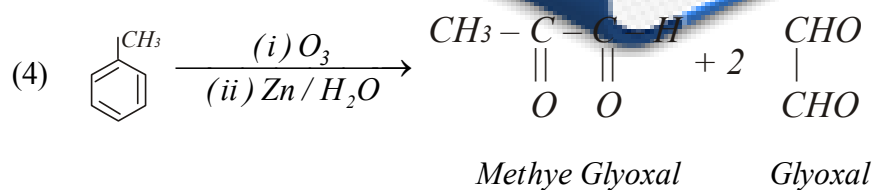
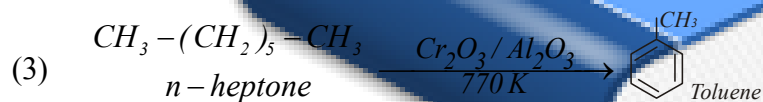
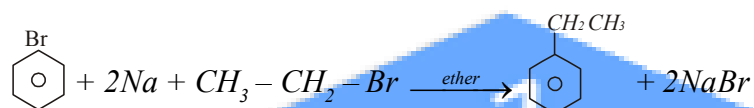


-: Alkyne :-



-:Arene:-

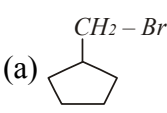
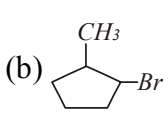
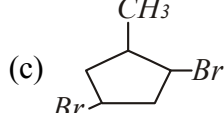
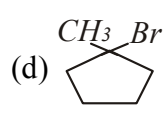
(1) Wurtz-Fitting Reaction :-



M.C.Q.

- (1) Chloroethane reacts with Na in Presence of dry ether. The Product is
(a) Ethane (b) Propane (c) Butane (d) Ethene
- (2) Which represents an alkyne ?
(a) C_5H_{10} (b) C_5H_{12} (c) C_3H_8 (d) C_4H_6
- (3) If Sodium Propionate is heated with sodium propionate then what will be the product ?
(a) Ethane (b) Propane (c) Propionic acid (d) Propene
- (4) Electrolysis of aqueous solution of sodalime then what will be the product ?
(a) Methane (b) Ethane (c) Propane (d) Butane
- (5) The preparation of ethane by electrolysis of aqueous solution of sodium acetate is known as ?
(a) Grignard reaction (b) Wurtz reaction (c) Kolbe's synthesis (d) Frankland reaction
- (6) The highest boiling point is expected for
(a) n-butane (b) n-pentane (c) iso-Pentane (d) neo-pentane
- (7) Which one of the following has the lowest boiling point
(a) n-butane (b) 2-methylbutane (c) 2-methyl propane (d) n-pentane
- (8) Which of the following reactions will not give propane
(a) $CH_3CH_2CH_2Cl \xrightarrow[H_2O]{Mg / Ether}$ (b) $CH_3COCl \xrightarrow[H_2O]{CH_3MgX}$
(c) $CH_3-CH=CH_2 \xrightarrow[CH_3COOH]{B_2H_6}$ (d) $CH_3-\underset{\substack{| \\ OH}}{CH}-CH_3 \xrightarrow[Red P]{2HI}$
- (9) Halogenation of alkane is an example of ?
(a) Electrophilic Substitution (b) Nucleophilic substitution
(c) Free radical substitution (d) Addition reaction
- (10) When ethyl iodide and propyl iodide react with Sodium in presence of ether they form ?
(a) Only One alkane (b) Mixture of two alkane
(c) Mixture of three alkane (d) Mixture of four alkane
- (11) $CH_3CH_2OH + CH_3MgBr \rightarrow Product$.
Product in above reaction is
(a) Methane (b) Ethane (c) Propane (d) Butane
- (12) LPG is a mixture of ?
(a) $CH_4 + C_2H_6$ (b) $C_3H_8 + C_4H_{10}$ (c) $C_2H_4 + C_2H_2$ (d) $C_6H_6 + C_6H_{12}$
- (13) Aqueous solution of the which of following compound on electrolysis gives ethane ?
(a) Sodium formate (b) Sodium acetate (c) Ethanoic acid (d) Ethylacetate
- (14) As the number of branches in a chain increases the boiling point of alkane.....
(a) Increases (b) Decreases (c) Remains same (d) May increases or decreases

- (15) Give IUPAC name of $(CH_3)_2 - C - (C_2H_5)_2$
- (a) 2-methyl 2-ethylbutane (b) Dimethyl Diethyl methane
(c) 3, 3- dimethyl pentane (d) 2, 2- diethyl propane
- (16) Which conformational isomer of ethane is more stable ?
- (a) Skew (b) Staggered(Anti) (c) Partially eclipseds (d) Fully eclipsed
- (17) Which Conformational isomer of Cyclohexane is more stable ?
- (a) Chair (b) Twist boat (c) boat (d) half chair
- (18) The number of possible structural isomer of heptane is.
- (a) 8 (b) 9 (c) 10 (d) 12
- (19) Formation of alkane by the action of Zn on alkyl halide is called ?
- (a) Frankland's reaction (b) Wurtz reaction
(c) Cannizzaro reactions (d) Kolbe's reactions
- (20) $C_2H_5Cl + H_2 \xrightarrow{Pd/c}$ Product. Name the Product
- (a) Ethene (b) Ethane (c) Ethyne (d) Methane + Methane
- (21) $C_{10}H_{22} \xrightarrow{900k}$ $C_4H_8 + C_6H_{14}$ Name the reaction
- (a) Elimination (b) Addition (c) Pyrolysis (d) Isomerisation
- (22) Which alkane is known as Mars Gas
- (a) CH_4 (b) C_2H_6 (c) C_3H_8 (d) C_4H_{10}
- (23) n- butane on reacting with bromine in presence of sun light given mainly ----
- (a) $CH_3 - CH_2 - CH_2 - CH_2Br$ (b) $CH_3CH_2CH Br CH_3$
- (c)
$$\begin{array}{c} CH_3 - CH - CH_2 - Br \\ | \\ CH_3 \end{array}$$
 (d)
$$\begin{array}{c} CH_3 \\ | \\ CH_3 - C - Br \\ | \\ CH_3 \end{array}$$
- (24) Which one of the following contain iso-propyl group ?
- (a) 2,2,3,3-tetramethyl pentane (b) 2- methyl pentane
(c) 2,2,3-trimethyl pentane (d) 3,3-dimethyl pentane
- (25) How many Chiral Compounds are possible on monochlorination of 2-methyl butane
- (a) 2 (b) 4 (c) 6 (d) 8
- (26) How many moles of O_2 are required for complete combustion of one mole of propane
- (a) 3 (b) 10 (c) 5 (d) 6
- (27) $CH_3CH(OH)CH_3 \xrightarrow{HCl} A \xrightarrow[C_2H_5OH]{Zn - Cu} B$ In this reaction end product (B) will be
- (a) $CH_3CHClCH_3$ (b) $CH_3CH = CH_2$ (c) $CH_3CH_2CH_3$ (d) $CH_3CH(OC_2H_5)CH_3$

- (28) Methyl chloride react with Lithium diethyl Copper to give---
- (a) Ethane (b) Propane (c) Butane (d) Propene
- (29) Which of the following alkyl bromides may be used for the synthesis of 2,3-dimethylbutane by Wurtz reaction ?
- (a) n-propyl bromide (b) iso-propyl bromide (c) n-butyl bromide (d) iso-butyl bromide
- (30) The major product formed by monobromination of methylcyclopentane is----
- (a)  (b)  (c)  (d) 
- (31) Alkene usually show which type of reaction ?
- (a) Substitution (b) Addition (c) Elimination (d) Rearrangement
- (32) When ethene treated with Br₂ in presence of CCl₄ Which compound is formed
- (a) 1, 2-dibromoethane (b) 1-bromo-2-chloroethane
- (c) Both(A) and (B) (d) 1-bromo ethaen
- (33) $CH_3CH_2Cl \xrightarrow[\text{KOH}]{\text{Alcoholic}}$ A. the product is
- (a) CH_3CH_2OH (b) CH_3CHO (c) $CH_3 - CH_3$ (d) $CH_2 = CH_2$
- (34) When butane 2-ol is heated with H₂SO₄ the major product is
- (a) But-1-en (b) But-2-en (c) 2-methyl propene (d) Buta -1, 3-diene
- (35) $CH_2 = CH_2 \xrightarrow[\text{KOH/H}_2\text{O}]{\text{KMnO}_4}$ X. In this reaction product X is
- (a) Ethanol (b) Ethlene glycol (c) Ethane (d) Ethanoic Acid
- (36) In following reaction what will be the major product
- $CH_3CH = CH_2 + HCl \rightarrow$ Product
- (a) propane (b) 1-chloro propane (c) 2-chloro propane (d) Propanol
- (37) $CH_3CH = CH_2 + HBr \xrightarrow{\text{Peroxide}}$ give major product
- (a) 1-bromo propane (b) 2-bromo propane (c) propyne (d) propane
- (38) when 3-phenyl propene reacts with HBr in the presence of peroxide, the major product form is
- (a) 2-bromo-1-phenylpropane (b) 1,2-dibromo-3-phenyl propane
- (c) 3-(0-bromo phenyl)propane (d) 1-bromo-3-phenyl propane
- (39) Baeyer`s Test is used in the laboratory for
- (a) Detection of alcohol (b) Detection of double bonds
- (c) Detection of Glucose (d) Detection of amines
- (40) Aqueous H₂SO₄ reacts with 2-methyl-but-1-ene to give predominantly
- (a) 2-methyl-butane -1-ol (b) 2-methyl-butane -2-ol
- (c) Isobutyl Hydrogen sylphate (d) Sec. butylhydrogen sulphate

(41) Dilute aqueous KM_nO_4 reacts with $R-CH=CH-R$ to give

- (a) $R-CHO$ (b) $R-COOH$ (c) $\begin{array}{c} R-C-R \\ || \\ O \end{array}$ (d) $\begin{array}{c} R-CH-CH-R \\ | \quad | \\ OH \quad OH \end{array}$

(42) Alkene $RCH=CH-R$ reacts with Conc. KM_nO_4 to give

- (a) $\begin{array}{c} R-CH-CH-R \\ | \quad | \\ OH \quad OH \end{array}$ (b) $R-COOH$ (c) $\begin{array}{c} R-C-R \\ || \\ O \end{array}$ (d) $R-CHO$

(43) Ethylene reacts with Ozone gas to form the compound

- (a) $HCHO$ (b) C_2H_5OH (c) $\begin{array}{c} CH_2-O \\ \diagdown \quad | \\ O \quad \quad | \\ \diagup \quad | \\ CH_2-O \end{array}$ (d) CH_3CHO

(44) Cyclopentene on treatment with alkaline KM_nO_4 gives

- (a) Cyclopentanol (b) trans Cyclopenta-1, 2-diol
(c) Cis-1, 2-Cyclopentadiol (d) (B) and (C) both

(45) Ethene with acidic KM_nO_4 solution gives

- (a) Ethylene glycol (b) Ethylene oxide (c) Formaldehyde (d) Acetaldehyde

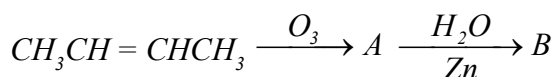
(46) $\begin{array}{c} CH_2-CH_2 \\ | \quad | \\ Br \quad Br \end{array} + Zn \xrightarrow{\Delta} \text{product, The product is}$

- (a) Ethane (b) Ethene (c) Ethyne (d) Ethyl bromide

(47) The addition of HBr to pent-2-ene gives

- (a) 2-bromo pentane (b) 3-bromo pentane
(c) Mixture of (A) and (B) (d) 1-bromopentane

(48) Identity B in the following sequence of reactions

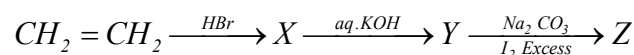


- (a) $2CH_3CHO$ (b) $2CH_3COCH_3$ (c) $2CH_3COOH$ (d) $CH_3CH_2CH_2CH_3$

(49) A hydrocarbon reacts with hypochlorous acid to give 1-chloro-2-hydroxy ethane, The hydrocarbon will be

- (a) Methane (b) Ethylene (c) Ethane (d) Ethyne

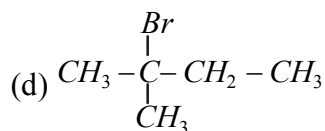
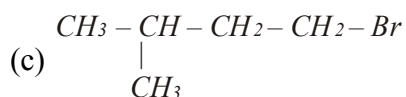
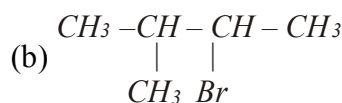
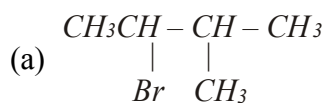
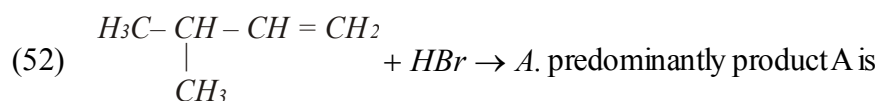
(50) Identify Z in the series



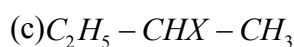
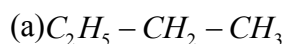
- (a) C_2H_5I (b) CH_3CH_2OH (c) CHI_3 (d) CH_3CHO

(51) What Would be the product when ethene is Oxidised with Baeyer's reagent ?

- (a) CH_2OH-CH_2OH (b) $\begin{array}{c} H-C-H \\ || \\ O \end{array}$ (c) $\begin{array}{c} H-C-OH \\ || \\ O \end{array}$ (d) $CO_2 + H_2O$



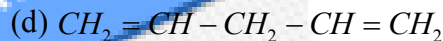
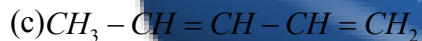
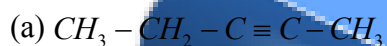
(53) In the reaction $\text{C}_2\text{H}_5-\text{CH}=\text{CH}_2 + \text{HX} \rightarrow$ product. What is the product



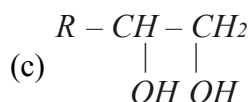
(54) Addition of HCl to propene in presence of peroxide gives



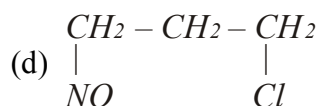
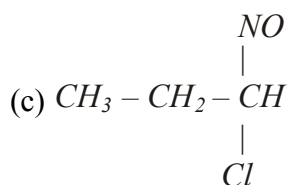
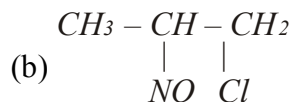
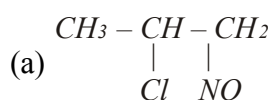
(55) Which unsaturated hydrocarbon on Ozono lysis gives Mixture of



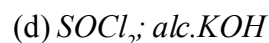
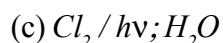
(56) $\text{R}-\text{CH}=\text{CH}_2 \xrightarrow{\text{B}_2\text{H}_6} \text{X} \xrightarrow{\text{H}_2\text{O}_2/\text{OH}^-} \text{Y}$. Final product Y is



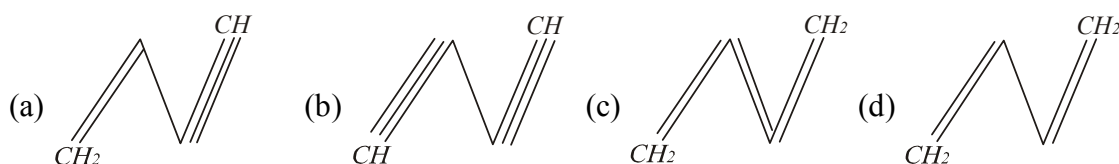
(57) $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{NOCl} \rightarrow \text{P}$. Identify the product.



(58) Which of the following sequence of reagents can be used for the Conversion of $\text{C}_6\text{H}_5-\text{CH}_2-\text{CH}_3$ into $\text{C}_6\text{H}_5-\text{CH}=\text{CH}_2$



- (59) The dehydrohalogenation of neopentylbromide mainly gives
 (a) 2-methyl-but-1-ene (b) 2-methyl-but-2-ene
 (c) But-2-ene (d) 2,2-dimethyl-but-1-ene
- (60) 1,3-butadiene (Buta-1,3-diene) reacts with ethylene to form
 (a) Benzene (b) Cyclohexane (c) Cyclohexene (d) 2,3-dimethyl butane
- (61) Which of the following represents the given mode of hybridization $SP^2 - SP^2 - SP - SP$ from left to right



- (62) A reagent used to test for unsaturation of alkene is
 (a) *Conc.* H_2SO_4 (b) Ammonicals Cu_2Cl_2
 (c) Ammonicals $AgNO_3$ (d) Solution Br_2 in CCl_4
- (63) The product obtained when Chloroform is heated with Silver powder is
 (a) Ethane (b) Ethene (c) Ethyne (d) Chloromethane
- (64) What is the Chief product of reaction between Ethylidene dichloride and alc. $KOH / NaNH_2$
 (a) $CH_3 - CH_2 - Cl$ (b) $CH = CH$ (c) $CH_2 = CH_2$ (d) $CH_3 - CH_3$
- (65)
$$CH_3 - \underset{\substack{| \\ Br}}{CH} - \underset{\substack{| \\ Br}}{CH_2} + 2NaNH_2 \xrightarrow{Liq.NH_3} X$$
- (a) $CH_3 - CH = CH_2Br$ (b) $CH_3 - CH = CH_2$
 (c) $CH_3 - C = CH$ (d) $CH_3 - CH_2 - CH_3$

- (66) Ethylene dibromide on heating with alc. KOH gives mainly.
 (a) Ethane (b) Ethylene (c) Acetylene (d) Ethyl bromide
- (67) Which unsaturated compound is produced by electrolysis of Potassium maleate or fumarate ?
 (a) Ethene (b) But-2-ene (c) Ethyne (d) But-2-yne

- (68) $CH \equiv CH \xrightarrow[196k]{Na / Liq.NH_3} P \xrightarrow{CH_3CH_2Br} Q$
- (a) $CH_3 - CH_2 - C \equiv CH$ (b) $CH_3 - C \equiv C - CH_3$
 (c) $CH_3 - CH_2 - CH = CH_2$ (d) $CH_3 - CH = CH - CH_3$
- (69) Propyne is formed by reaction of
 (a) CH_3Br with Acetylene (b) CH_3Br with Sodium acetylide
 (c) CH_3I with Sodium acetate (d) methane with Ethene

- (70) The gas which gives Benzene on passing through a red hot iron tube is
 (a) C_2H_6 (b) C_2H_4 (c) C_6H_{12} (d) C_2H_2
- (71) In presence of nickel cyanide, acetylene gives
 (a) Benzene (b) Cyclohexane (c) Cyclo octa tetraene (d) Cyclohexatriene
- (72) Which reagent of the following will convert But-1-yne to Butane-2-on
 (a) H_2O / H^+ (b) Hg^{+2} / H_2SO_4
 (c) $Conc. H_2SO_4 / H_3PO_4$ (d) $K_2Cr_2O_7 / Kmn O_4$
- (73) Addition of Hydrobromic acid with Ethyne gives finally
 (a) $CH_2 = CH - Br$ (b) $Br - CH_2 - CH_2 - Br$
 (c) $CH_3 - CH - Br_2$ (d) $CH \equiv C - Br$
- (74) Addition of HCN to Acetylene in presence of $Ba(CN)_2$ gives
 (a) Cyanoethane (b) propanenitrile (c) Acrylonitrile (d) Ethyl Cyanides
- (75) What is the product formed when acetylene reacts with hypochlorous acid ?
 (a) CH_3COCl (b) $Cl CH_2CHO$ (c) Cl_2CHCHO (d) $ClCH_2COOH$
- (76) But-1-yne on Oxidation with hot alkeline $Kmn O_4$ gives
 (a) $CH_3CH_2CH_2COOH$ (b) CH_3CH_2COOH
 (c) $CH_3CH_2COOH + CO_2 + H_2O$ (d) $CH_3COOH + HCOOH$
- (77) But-2-yne on Oxidation with hot alkeline $KMn O_4$ gives.
 (a) $CH_3CH_2COOH + HCOOH$ (b) $CH_3COOH + CH_3COOH$
 (c) $CH_3CH_2COOH + CO_2 + H_2O$ (d) $CH_3COOH + 2CO_2 + H_2O$
- (78) Acetylene reacts with Ethylmagnesium bromide to give
 (a) Butane (b) Ethane (c) But-1-ene (d) Ethene
- (79) The Compound $X(C_3H_8)$ reacts with Ammonical $AgNO_3$ to gives a white ppt and on oxidation with hot alk, $KMnO_4$ gives acid $(CH_3)_2CHCOOH$ there fore X is
 (a) Pent-1, 3-diene (b) pent-1-yne (c) 3-methyl but-1-yne (d) pent-2-yne
- (80) $HC \equiv CH + O_3 \xrightarrow[196k]{CH_2Cl_2} X \xrightarrow{Zn / H_2O} Y$. End product y is
 (a) $\begin{array}{c} H - C - C - H \\ || \quad || \\ O \quad O \end{array}$ (b) $CH_3CH_2CH_2CHO$
 (c) $\begin{array}{c} CH_3 - C - C - CH_3 \\ || \quad || \\ O \quad O \end{array}$ (d) $CH_3CH_2CH_2COOH$

(81) Reductive Ozonolysis of But-2-yne gives

- (a) Glyoxal (b) $2CH_3COOH$ (c) Buta-2, 3-dione (d) Butanal

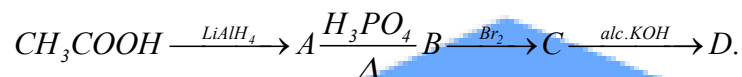
(82) Give product in following reaction $CH_3 - CH_2 - C \equiv CH \dots ?$

- (a) $CH_3CH_2CH = CH_2$ (b) $CH_3CH = CHCH_3$
(c) $\begin{array}{c} CH_3CH_2C = CH_2 \\ | \\ OH \end{array}$ (d) $CH_3C \equiv C - CH_3$

(83) $CH_3 - C \equiv C - CH_3 \xrightarrow[\text{Paraffin Oil}]{Na NH_2} X$ Identify product X

- (a) $\begin{array}{c} CH_3 - C = C - CH_3 \\ | \quad | \\ Na \quad NH_2 \end{array}$ (b) $CH_3CHO + CH_3CHO$
(c) $CH_3CH_2C \equiv CH$ (d) $CH_3COOH + CH_3COOH$

(84) Identify the product C in the following series of reaction



- (a) Ethene (b) Ethyne (c) Ethane (d) Vinyl alcohol



in above reaction A and B are respectively.

- (a) cis and trans but-2-ene (b) trans and cis but-2-ene
(c) Both cis but-2-ene (d) Both trans but-2-ene

(86) Reduction of acetylene in presence of Ni/Pd gives

- (a) Ethane (b) Ethene (c) Ethanol (d) Ethanamide

(87) 2-hexyne gives trans-2-hexene on treatment with

- (a) Pt / H_2 (b) Li / NH_3 (c) $Pd / BaSO_4$ (d) $LiAlH_4$

(88) Which carbide react with water to give propyne ?







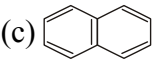
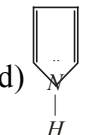


- (a) SiC (b) Be_2C (c) Mg_2C_3 (d) Al_4C_3

(89) Number of acidic hydrogen in 1-butyne are

- (a) 1 (b) 2 (c) 3 (d) 4

(90) Which reagent distinguish between But-1-yne and But-2-yne

- (a) $Alk. KMnO_4$ (b) Br_2 (c) $Conc. H_2SO_4$ (d) $[Ag(NH_3)_2]^+$

- (91) Point out the wrong statement in relation to the structure of Benzene.
- (a) It forms only one monosubstituted derivative
 (b) The C-C bond length in benzene is uniformly 1.397 \AA
 (c) It is a resonance hybrid of a number of canonical forms
 (d) It has three delocalised π -molecular orbitals
- (92) Which of the following when treated with superheated steam under pressure gives benzene?
- (a) Benzene Sulphonic acid (b) Benzyl Chloride
 (c) Bromo Benzene (d) Nitro benzene
- (93) Which of the following is aromatic
- (a)  (b)  (c)  (d) 
- (94) Which is non-aromatic compound
- (a)  (b)  (c)  (d) 
- (95) Which is not an aromatic hydrocarbon?
- (a) Benzene (b) Toluene (c) phenol (d) Naphthalene
- (96) Which of the following is not aromatic?
- (a) Benzene (b) Cyclopropenyl cation
 (c) Tropylium cation (d) Cyclopentadienyl cation
- (97) Benzene reacts with CH_3COCl in the presence of AlCl_3 to give
- (a) $\text{C}_6\text{H}_5\text{Cl}$ (b) $\text{C}_6\text{H}_5\text{COCl}$ (c) $\text{C}_6\text{H}_5\text{COCH}_3$ (d) $\text{C}_6\text{H}_5\text{CH}_3$
- (98) Nitration of Benzene is
- (a) Electrophilic Substitution (b) Nucleophilic Substitution
 (c) Electrophilic addition (d) Free radical Substitution
- (99) In the nitration of benzene the attack on the ring is made by
- (a) NO_2 (b) NO_2^- (c) NO_2^+ (d) NO_3^-
- (100) In the bromination of benzene which electrophile attacks the ring?
- (a) Br^+ (b) Br^- (c) Br_2 (d) Br^\bullet
- (101)  + $3\text{H}_2 \xrightarrow[150^\circ\text{C}]{[\text{Ni}]}$ 
- Above reaction is the example of
- (a) Substitution (b) Addition (c) Elimination (d) Rearrangement
- (102) Benzene reacts with Cl_2 in the presence of light to give
- (a) Chlorobenzene (b) Benzyl chloride (c) 1,2-dichlorobenzene (d) Benzene hexachloride


(103) Benzene reacts with Cl_2 in presence of FeCl_3 to give
 (a) BHC (b) Chlorobenzene (c) Hexachlorocyclohexane (d) Benzyl chloride

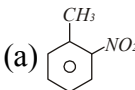
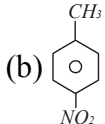
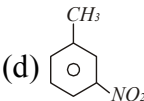
(104) Which is m-directing group ?

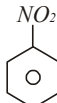
(a) $-\text{C}_2\text{H}_5$ (b) $-\text{OH}$ (c) $-\text{CHO}$ (d) $-\text{OCH}_3$

(105) Which is O/P-directing group ?

(a) $-\text{COOH}$ (b) $-\text{NO}_2$ (c) $-\text{COCH}_3$ (d) $-\text{OCH}_3$

(106)  $\xrightarrow[\text{[H}_2\text{SO}_4\text{]}]{\text{conc. HNO}_3}$ X. Product X is

(a)  (b)  (c) Mixture of (A) & (B) (d) 

(107)  $\xrightarrow[\text{[FeCl}_3\text{]}]{\text{Cl}_2}$ X. product X is

(a)  (b)  (c)  (d) 

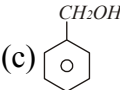
(108) When O-Cresol is heated with Zn it gives

(a) Phenol (b) Toluene (c) Xylene (d) Benzene

(109) When Toluene reacts with Cl_2 in presence of UV light it gives


(a)  (b)  (c)  (d) 

(110) Toluene reacts with hot acidic KMnO_4 to give


(a)  (b)  (c)  (d) 

(111) Toluene reacts with chromyl chloride to give

(a)  (b)  (c)  (d) 

(112)  + $3 \text{HNO}_3 \xrightarrow[\text{fuming}]{\text{H}_2\text{SO}_4, 111^\circ\text{C}}$ X Identify product X

(a) ONT (b) PNT (c) TNT (d) DNT

(113)  $\xrightarrow[\text{Fuming H}_2\text{SO}_4]{110^\circ\text{C, Fuming HNO}_3}$ P $\xrightarrow[\Delta]{\text{KMnO}_4 / \text{HF}}$ Q $\xrightarrow[\Delta]{\text{Sodalime}}$ R

What will be the final product R

(a) OTS (b) PTS (c) TNT (d) TNB

(114) When a mixture of O-bromotoluene and methylbromide is treated with sodium in presence of ether it gives



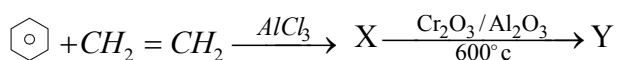
(115) Upon Oxidation with $KMnO_4 / H^+$ m-Xylene Form

- (a) Phthalic acid (b) Isophthalic acid (c) Terphthalic acid (d) Salicylic acid

(116) Catalytic reduction of styrene gives

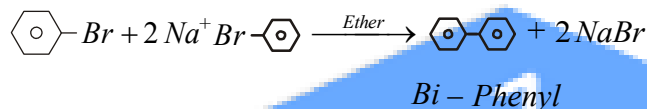
- (a) Benzene (b) Toluene (c) Xylene (d) Ethylbenzene

(117) Identify product Y in following reaction



- (a) Ethyl benzene (b) methyl benzene (c) Benzene acid (d) Styrene

(118) Following reaction is known as



- (a) Wurtz (b) Fitting (c) Wurtz-Fitting (d) Grignard

(119) Benzene on ozonolysis followed by reaction with zinc and water gives

- (a) Benzoic acid (b) Benzaldehyde (c) Glyoxal (d) Acetylene

(120) $C_6H_6 \xrightarrow[\text{H}_2\text{SO}_4]{\text{HNO}_3} \text{X} \xrightarrow[\text{FeCl}_3]{\text{Cl}_2} \text{Y}$ In this reaction Y is

- (a) 1-nitro chlorobenzene (b) 3-nitro chlorobenzene
(c) 4-nitro chlorobenzene (d) 1,2-dinitro chlorobenzene

(121) Which of the following will undergo metasubstitution on monochlorination

- (a) Phenol (b) Ethoxy Ethane (c) Ethylbezoate (d) chlorobezene

(122) Decreasing order of C-C bond length in following compounds is

(I) C_2H_4 (II) C_2H_2 (III) C_6H_6 (IV) C_2H_6

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

(123) n-Heptane $\xrightarrow[\Delta]{\text{Aromatization} [\text{Al}_2\text{O}_3 + \text{Cr}_2\text{O}_3]} ?$

- (a) Benzene (b) Toluene (c) Hept-2-ene (d) Hept-1-ene

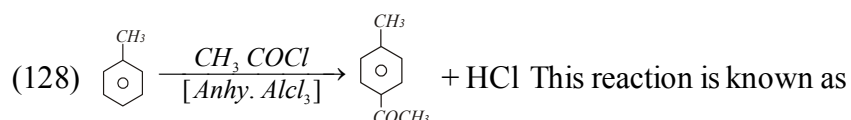
(124) Benzene is obtained by heating phenol with X then X is

- (a) Zn dust (b) Soda lime (c) Sodium hydroxide (d) My / ether

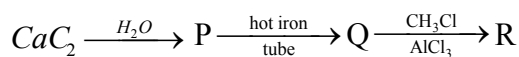
(125) Which is aromatic



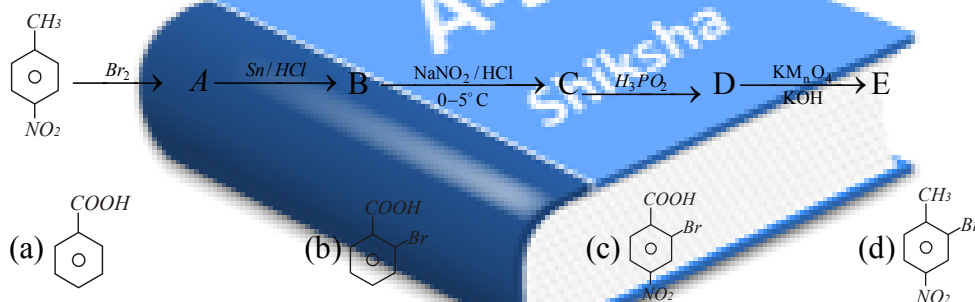
- (126) In presence of light and heat toluene chlorinated and react with aq. NaOH to give
 (a) O - Cresol (b) P - Cresol
 (c) Mixture of (A) and (B) (d) Benzoic acid
- (127) Sulphonation of compound A followed by fusion with NaOH gives mixture of O- cresol & p- cresol. compound A is
 (a) Benzene (b) Toluene
 (c) phenol (d) Benzene sulphonic acid



- (a) Kolbe's reaction (b) Sandmeyer reaction
 (c) Diels-(Alder) reaction (d) Friedel-craft's Acylation
- (129) In the following reaction, the product R is



- (a) Benzene (b) Toluene (c) Chlorobenzene (d) Xylene
- (130) Identify the product (E) in the following sequence of reaction



Assertion and Reason type Questions

Direction:- In each of the following Questions Read the Assertion(A) and Reason (R) carefully. Choose Correct option as under and darken the bubbles in OMR.

- (A) If both A and R are true and R is the Correct explanation of A
 (B) If both A and R are true but R is not the Correct explanation of A
 (C) If A is true but R is false
 (D) If both A and R are false
 (E) If A is false but R is true
- (131) A : Pyrrole is an aromatic heterocyclic compound
 R : It has a cyclic, delocalised 6π electrons
- (132) A : CH_4 does not react with Cl_2 in dark
 R : Chlorination of CH_4 takes place in Sunlight

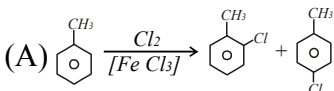
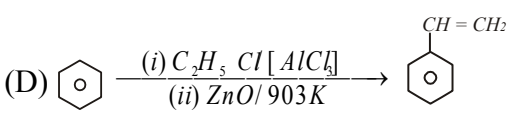
- (133) A : Neopentane forms only one monosubstituted Compound
R : Neopentane has high bond energy
- (134) A : Addition of HBr to propene in presence of peroxide gives 1-bromo propane.
R : The reaction occurs by Free radical mechanism
- (135) A : Styrene on reaction with HBr gives 2-bromo-2-phenylethane
R : Benzyl radical is more stable than alkyl radicals
- (136) A : Butane-1-ol on dehydration *Conc. H₂SO₄* gives mainly But-1-en
R : Dehydration occurs through Carbocation intermediate
- (137) A : Melting point of neopentane is higher than that of iso-pentane
R : Neopentane Contains a quaternary carbon
- (138) A : Acetylene react with NaNH₂ to give Sodium acetylide and ammonia
R : sp-hybridized carbon of acetylene are considerably electronegative
- (139) A : Addition of H₂O to acetylene occurs in presence of dil.
H₂SO₄ and *HgSO₄* to give acetaldehyde
R : It is an example of electrophilic addition reaction
- (140) A : Addition of HI to vinyl chloride produces 1-chloro1-iodoethane
R : HI adds to vinyl chloride against markownikov's Rule

Matrix Match type Questions

Direction :- Match the entries of column I with entries of column II. Each entry of column I may have one or more correct matching from column II. if the correct matches are $A \rightarrow P, S, B \rightarrow r, C \rightarrow p, q, D \rightarrow s$ then the correctly bubbled 4×4 matrix should be as below.

	p	q	r	s
A	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
B	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

(141) Match the reactions in column I with approp type of reaction as given in column II

column I	column II
(A) 	(p) Substitution Reaction
(B) $CH_3CH_2Cl \xrightarrow[(ii) H \downarrow Ni]{(i) Alc \cdot KOH} CH_2=CH_2$	(q) Addition Reaction
(C) $HC=CH \xrightarrow[(ii) [AlCl_3]{(i) H_2SO_4 / HgSO_4} C_6H_5CH_3$	(r) Elimination Reaction
(D) 	(s) Rearrangement

(142)

column I	column II
(A)-CHO	(P) O/P Director
(B)-OH	(Q) Activating Benzene Ring
(C)-NH ₂	(R) m-Director
(D)-Cl	(S) Deactivating Benzene Ring

(143)

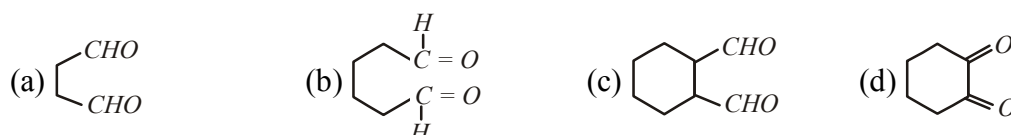
column I	column II
(A) Benzene	(p) Wurtz reaction of C_2H_5Cl
(B) Ethene	(q) Evolves H_2 when heated with sodium metal
(C) Ethyne	(r) Dehydration of ethanol
(D) Butane	(s) Electrophilic substitution

Comprehension type Questions

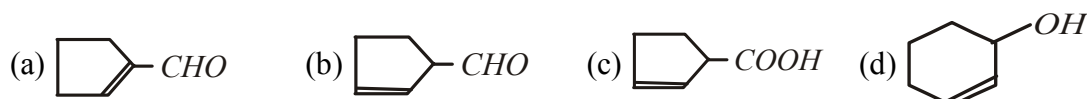
Direction :- Question numbers 144 and 145 are based on the following paragraph. Each question has 4 options (A),(B),(C) ,(D) out of which ONLY ONE is correct. choose the correct option.

Paragraph :- Cyclohexene on ozonolysis following by reaction with Zinc dust and water gives aldehyde(P). Compound (p) on further treatment with aqueous KOH yields compound(Q).

(144) The structure of compound (P) is



(145) The structure of compound (Q) is



Answer key

1 C	32 A	63 C	94 B	125 C
2 D	33 D	64 B	95 C	126 D
3 A	34 B	65 C	96 D	127 B
4 D	35 B	66 C	97 C	128 D
5 C	36 C	67 C	98 A	129 B
6 B	37 A	68 A	99 C	130 B
7 C	38 D	69 B	100 A	131 A
8 B	39 B	70 D	101 B	132 B
9 C	40 B	71 C	102 D	133 C
10 C	41 D	72 B	103 B	134 A
11 A	42 B	73 C	104 C	135 D
12 B	43 C	74 C	105 D	136 E
13 B	44 C	75 C	106 C	137 B
14 B	45 C	76 C	107 A	138 A
15 C	46 B	77 B	108 B	139 B
16 B	47 C	78 B	109 D	140 C
17 A	48 A	79 C	110 B	141 A. (p), B. (r), C. (q), D. (p)
18 B	49 B	80 A	111 A	142 A. (r), B. (p), C. (p, q), D. (p)
19 A	50 C	81 C	112 C	143 A. (s), B. (r), C. (q), D. (p)
20 B	51 A	82 D	113 D	144 B
21 C	52 D	83 C	114 A	145 A
22 A	53 C	84 B	115 B	
23 B	54 B	85 A	116 D	
24 B	55 C	86 A	117 D	
25 B	56 B	87 B	118 B	
26 C	57 A	88 C	119 C	
27 C	58 B	89 A	120 B	
28 B	59 B	90 D	121 C	
29 B	60 C	91 C	122 A	
30 D	61 A	92 A	123 B	
31 B	62 D	93 C	124 A	

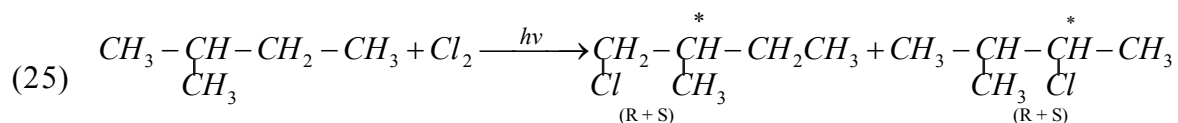
Hints

- (1) Wurtz Reaction :- $2CH_3CH_2Cl + 2Na \xrightarrow{\text{Ether}} CH_3 - CH_2 - CH_2 - CH_3 + 2NaCl$
- (2) Alkyne $C_nH_{2n-2} \Rightarrow C_4H_6$
- (3) $CH_3CH_2COONa + NaOH \xrightarrow[\text{soda-lime}]{CaO} CH_3 - CH_3 + Na_2CO_3$
- Sodalime Decarboxylation of Sodium Salt of Carboxylic acid gives alkane containing one carbon less than the carboxylic acid
- (4) $2CH_3CH_2CO\bar{O}Na^+ + 2H_2O \xrightarrow{\text{Electrolysis}} CH_3CH_2CH_2CH_3 + 2CO_2 + H_2 + 2NaOH$
- Electrolysis of aqueous solution of Sodium Salt of Carboxylic acid gives Alkane Containing even number of carbon (Kolbe's synthesis)
- (5) This preparation is known as Kolbe's synthesis
- (6) Boiling \propto Molecular mass $\propto \frac{1}{\text{number of branches}}$
- (7) According to Que-6
- (8) $CH_3COCl + CH_3MgCl \xrightarrow{H_2O} CH_3COCH_3 + MgCl_2$ (This reaction gives Ketone)
- (9) This reaction is carried out by Free Radical intermediate.
- (10) $R - X + 2Na + R - X \xrightarrow{\text{Ether}} R - R + R - R + R - R$
- (11) $C_2H_5O\bar{H} + CH_3MgBr \rightarrow CH_4 + Mg\langle \begin{smallmatrix} Br \\ O_2H_5 \end{smallmatrix} \right.$
- (12) LPG is a mixture of mainly propane and butane
- (13) $2CH_3CO\bar{O}Na^+ + 2H_2O \xrightarrow{\text{electrolysis}} CH_3 - CH_3 + 2CO_2 + 2NaOH + H_2$
- (14) Que-6
- (15) $\overset{1}{C}H_3 - \overset{2}{C}H_2 - \overset{3}{\underset{CH_3}{\overset{CH_3}{C}}} - \overset{4}{C}H_2 - \overset{5}{C}H_3$ 3, 3 - dimethyl pentane
- (16) The relative stability of conformation isomers of Alkane like Ethane, propane staggered (Anti) > Skew or Gauche > partial eclipsed > Full eclipsed
- (17) The relative stability of conformation isomer of cyclohexane is
Chair > twist boat > boat > half Chair
- (18)
- | Alkane | Butane | pentane | Hexane | Heptane |
|--------------------|--------|---------|--------|---------|
| structural isomers | 2 | 3 | 5 | 9 |
- (19) $2R - X + Zn \rightarrow R - R + ZnX_2$ (Frankland's Reaction)
- (20) $C_2H_5Cl + H_2 \xrightarrow{Pd/c} C_2H_6 + HCl$
- (21) when Higher hydrocarbon is heated it decomposes to Lower hydrocarbon (alkane, alkene). This reaction is known as Cracking or Pyrolysis

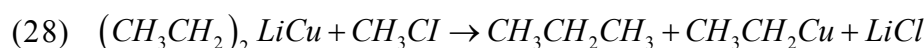
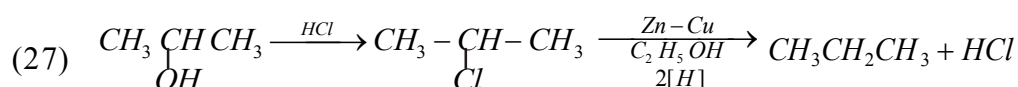
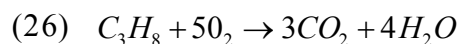
(22) Methane is known as mars gas

(23) because 2° carbonium ion is more stable than 1°

(24) $CH_3 - CH_2 - CH_2 - \underset{\text{CH}_3}{\text{CH}} - CH_3$ isopropyl group

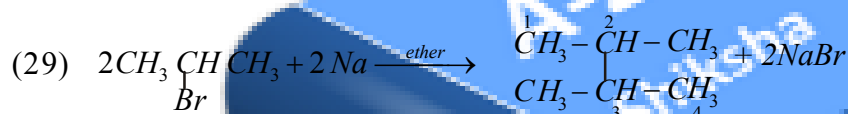


Star (*) indicate chiral (asymmetric) carbon. Here in both product R and S configurations are possible so that total 4 chiral compound are possible.



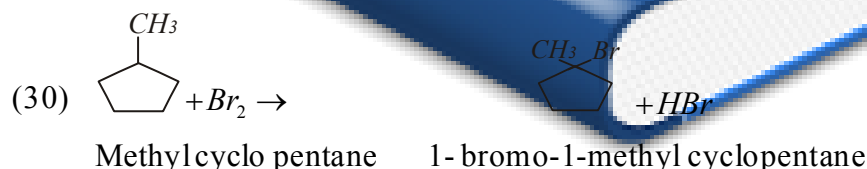
Lithium diethyl copper

This is known as Core-House reaction. It is suitable method for preparation of odd carbon Alkyne

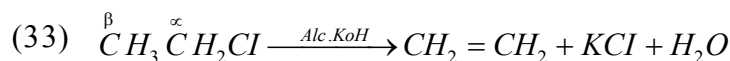
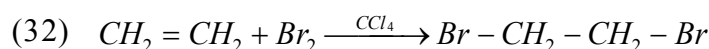


iso-propyl bromide

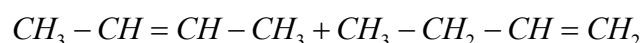
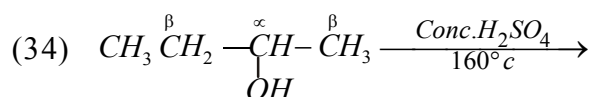
2,3- dimethyl butane



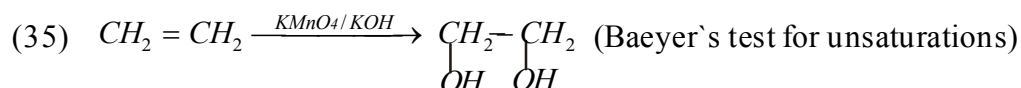
(31) Alkene shows mainly electrophilic addition reactions.

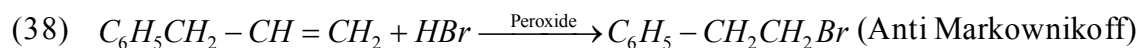
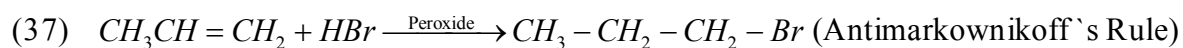
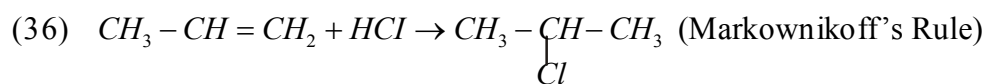


(β - Elimination reaction)

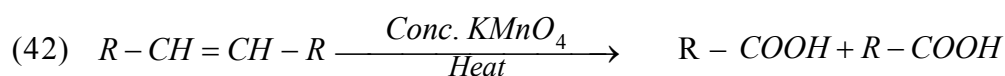
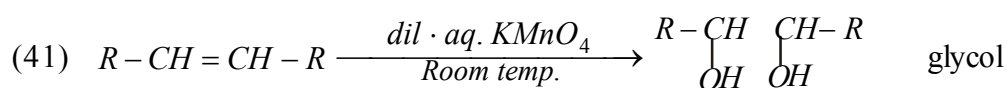
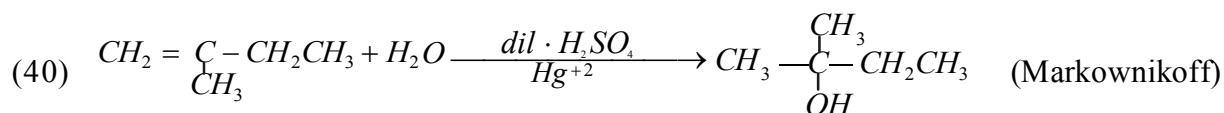


Dehydration of butane-1-ol or 2-ol gives trans-but-2-en as the major product. According to Saytzeff rule But-2-ene is more Substituted alkene and therefore it will be major.

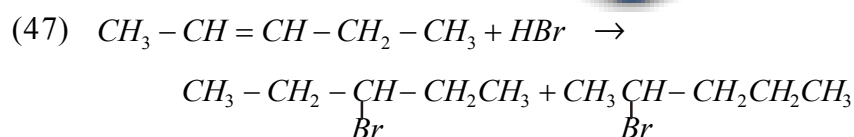
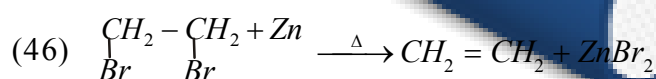
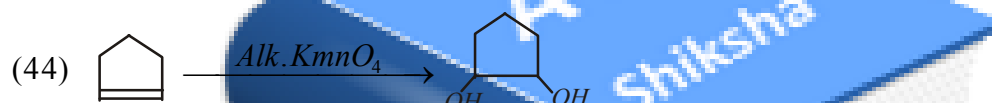
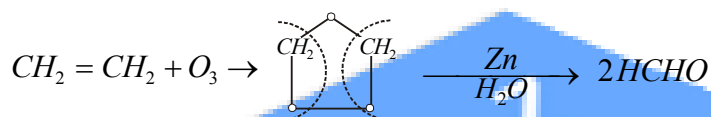




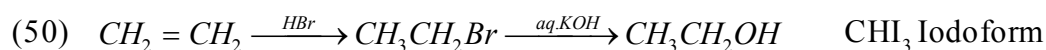
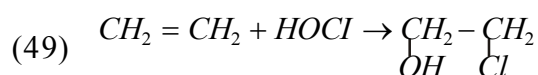
(39) The disappearance of the purple colour of $KMnO_4$ in its reaction with an alkene is the test for unsaturation (double bond). is known as Baeyer's Test.



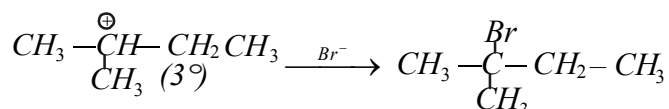
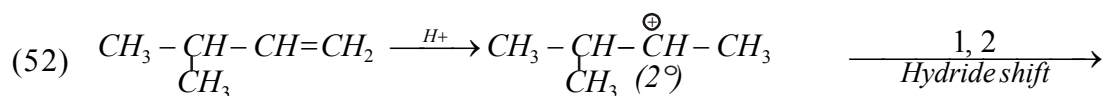
(43) Ozonolysis



(48) According to Que-43

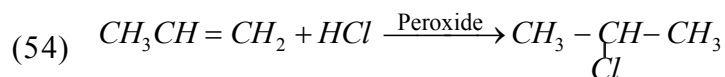


(51) According to Que-35



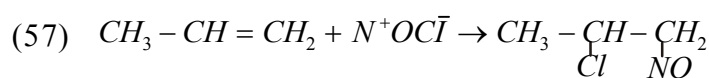
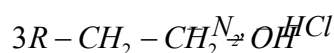
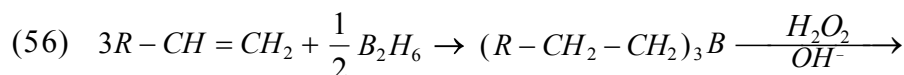
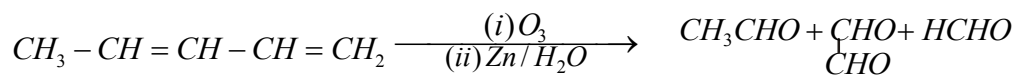
product will be major because 3° -Carbonium is more stable than 2°

(53) According to Markownikoffs Rules

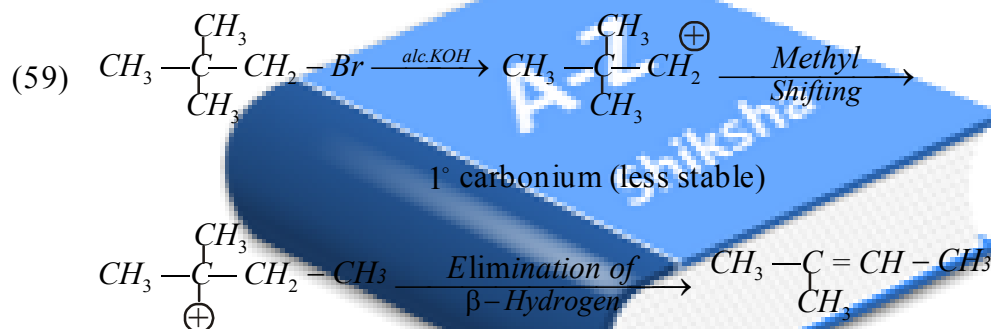


This reaction follows markownikoff's rule. Because peroxide effect or Anti markownikoff's rule is applicable only to HBr. It is not for HCl and HI.

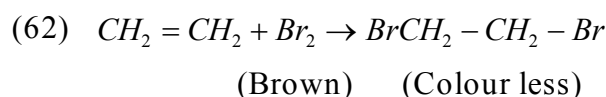
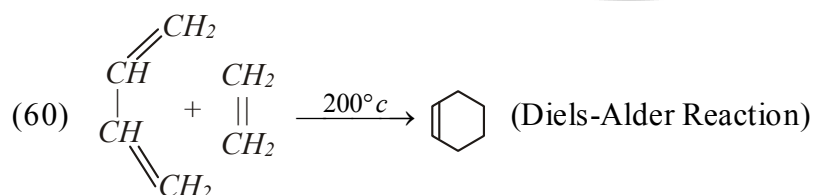
(55) Ozonolysis of alkene gives two carbonyl group (C=O) for cleavage of each $>C=C<$



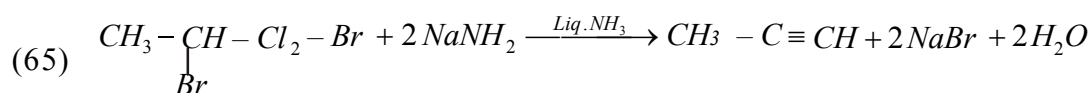
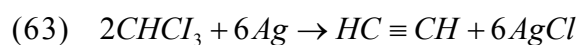
According to markownikoff addition of NOCl

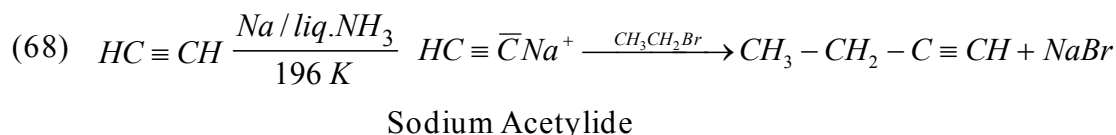
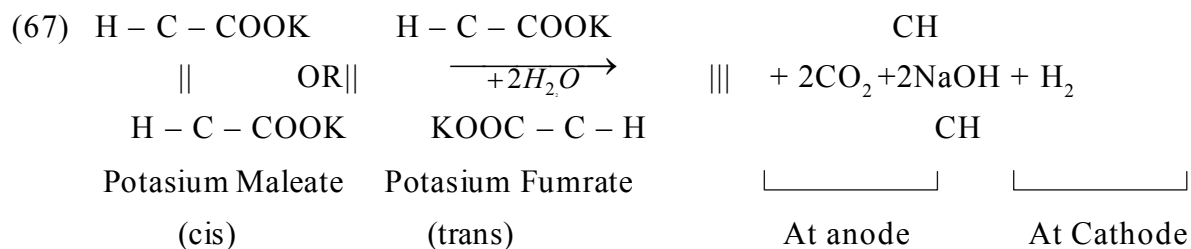
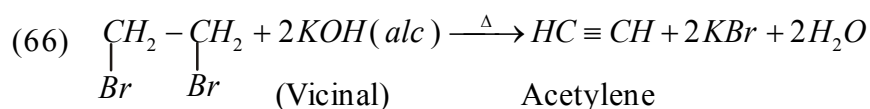


3° carbonium (more stable)

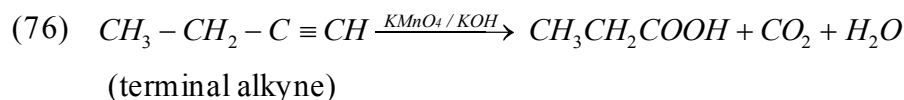
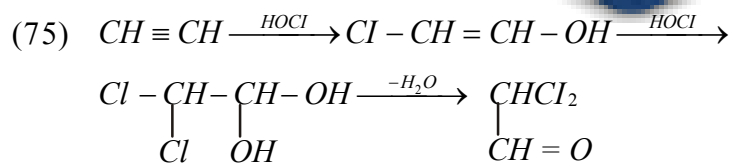
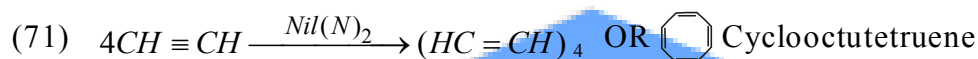
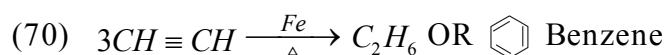


Disappearance of brown colour is the test for unsaturation

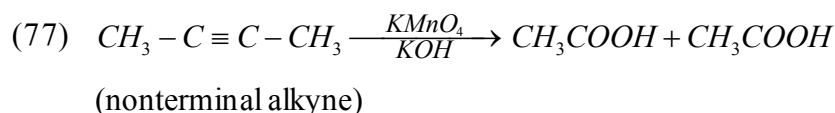




(69) According to Que-68



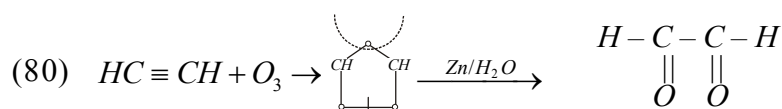
Oxidation of terminal alkyne gives acid and CO_2



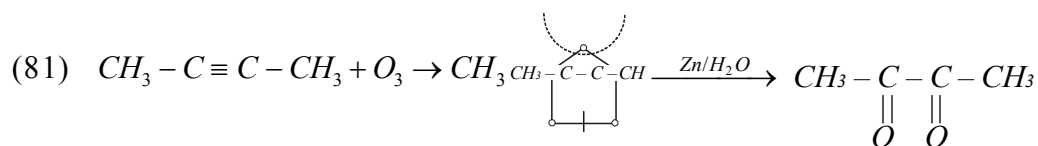
Oxidation of nonterminal alkyne gives mixture of two acids



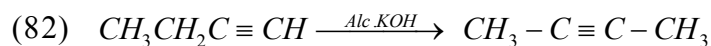
(79) According to Que-76



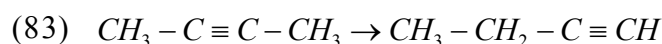
Glyoxal



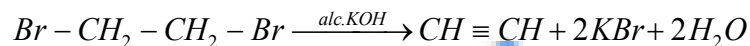
Buta -2-3-dione (Dimethyl Glyoxal)



Terminal alkyne undergo iso merisation to give non-terminal alkyne



Non-terminal alkyne undergo iso merisation to give terminal alkyne



(85) Alkyne with Lindlar's Catalyst ($Pd / BaSO_4$) gives Cis-alkene while with $Na / Liq. NH_3$ (Birch Reduction) gives trans-alkene

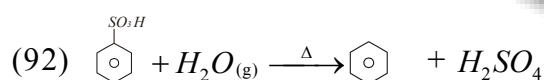


(87) According to Que-85




(89) Hydrogen attached to triplebonded carbon is acidic


(90) with $[Ag(NH_3)_2]^+$ 1-Alkyne will give reaction while 2-Alkyne will not give reaction

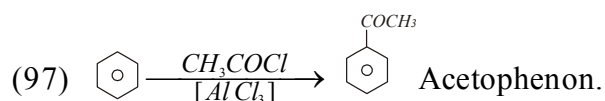


(93) 6π electrons

(94) According to Hukel's Rule Compound to be aromatic it should have $(4n+2)\pi e^-$ i.e It should have 2,6,10,14 πe^- electrons. But cyclo octa tetraene has 8 πe^- so it is non-aromatic

(95) phenol  is aromatic but not aromatic Hydrocarbon

(96)  It has 4 πe^- there for not aromatic

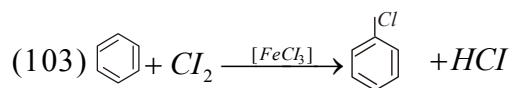
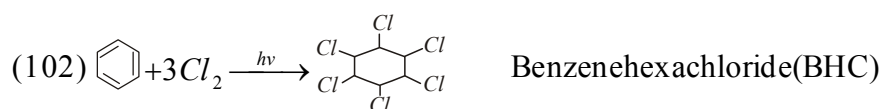


(98) Nitration, Sulphonation, Halogenation, Alkylation and Acylation of Benzene are Electrophilic Substitution Reactions.

(99) NO_2^+ is electrophile

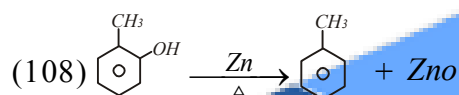
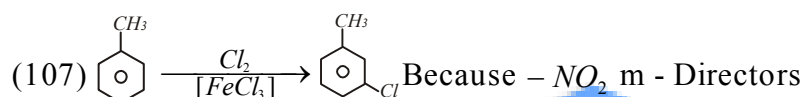
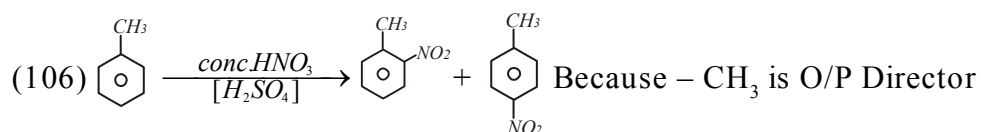
(100) Br^+ is electrophile

(101) Because double bonds of Benzene breaks on addition of H_2

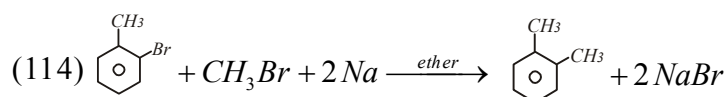
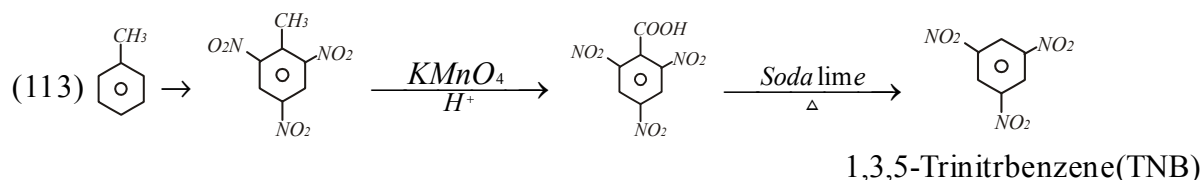
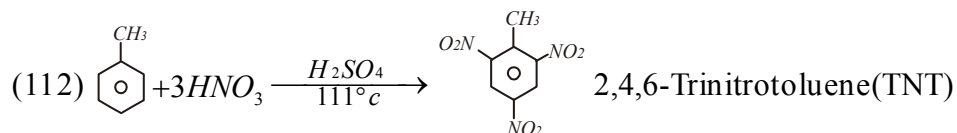
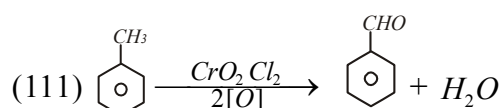
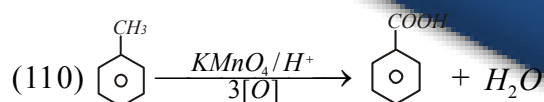
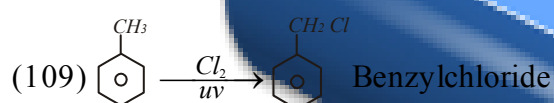


(104) m - Directors $\Rightarrow -NO_2, -SO_3H, -COOH, -CN, CHO, -COR$

(105) O-P Directors $\Rightarrow -CH_3, -OH, -OR, -NH_2, -X$ (Halogen)



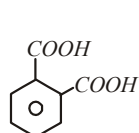
O-Cresol Toluene



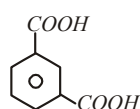
O-Xylene

This is known as wurtz- Fitting Reaction

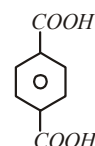
(115) Upon Oxidation of o, m, p-Xylenes forms corresponding dicarboxylic



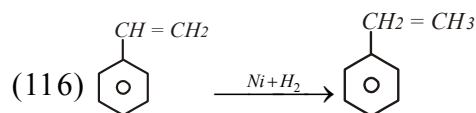
Phthalic acid



Isophthalic acid

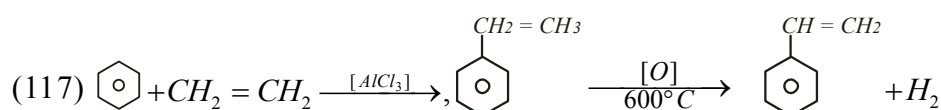


Terephthalic acid



Styrene

Ethylbenzene

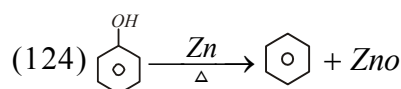
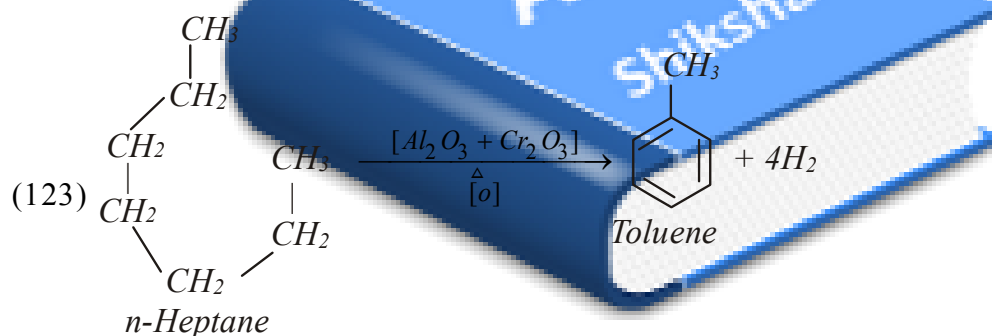


(119) According to Que-55

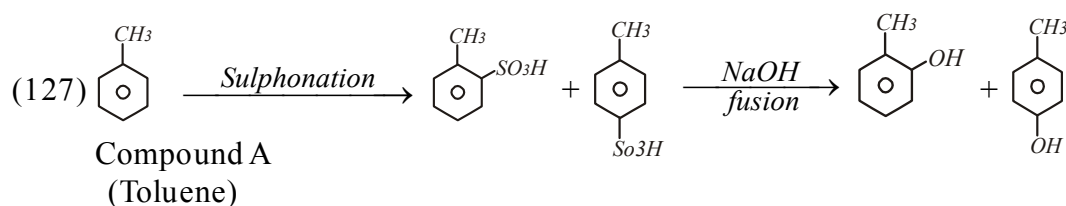
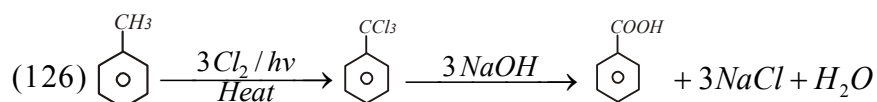
(120) $-NO_2$ is m- Director

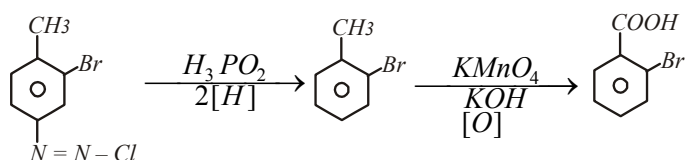
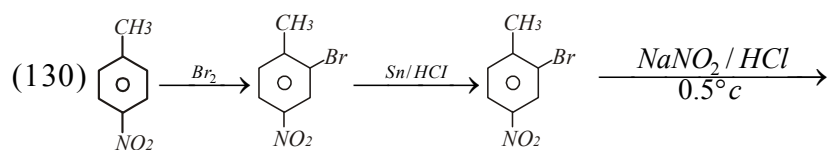
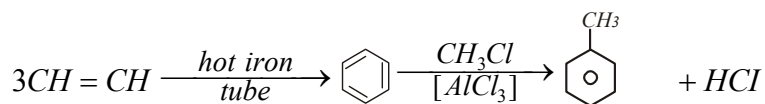
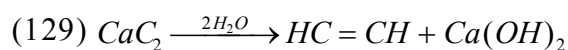
(121) $-COOC_2H_5$ m - Director


(122) Bond length $\propto 1/\text{Bond order}$ there for bond length in



(125) πe^- s in , , , are 4,4,6,4 there for according to Hukelis Rule (c) is Aromatic





(131)  Pyrole is aromatic because it is cyclic, and contains

$6 \pi \bar{e}$ s ($2 \times 2 \pi$ -bonds + lonepair of N)

(132) Correct explanation :- Chlorination of CH_4 is free radical reaction and free radicals are obtained in sunlight.

(133) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \text{CH}_3$ Correct R:- In neopentane four identical CH_3 groups are attached to

4° - carbon there for only one monosubstituted product is possible

(134) R is Correct explanation of A

(135) Correct A:- gives -1- bromo-1- phenyl ethane

Correct R:- Benzyl cation is more stable than alkyl cation

(136) Correct A:- Gives But-2-ene as a major product

(137) Correct explanation :- Neopentane being symmetrical packs more closely in the crystal lattice than isopentane

(138) R is the correct explanation of A

(139) Correct explanation :- Hg^{+2} ion being an electrophile attacks on $\pi \bar{e}$ of triple bond and then nucleophilic attack of H_2O occurs.

(140) HI adds to vinyl chloride according to markownikoff's Rule.

(142) O – P directors except halogen activates benzene ring while m-director deactivates.

