

HALOALKANES & HALOARENES
II PUC-CHEMISTRY

- Grove's method is used for the preparation of:
a) C₂H₅Cl b) C₂H₅Br c) C₂H₅F d) C₂H₅I
- The product formed when excess of chlorine is passed through benzyl chloride followed by hydrolysis is
a) benzal chloride b) benzotrichloride
c) benzoic acid d) chlorobenzene
- The C- Cl bond length is minimum in
a) CH₂ = CH - Cl b) (CH₃)₃ C - Cl
c) CH₃ CH₂ - Cl d) CH₂ = CH - CH₂Cl
- The compound that cannot be dehydrohalogenated is
a) ethyl bromide b) isopropyl chloride
c) propyl chloride d) benzyl chloride
- When an alcoholic solution of haloalkane is heated with ammonia in the ratio 1:1, the product formed is
a) a mixture of primary, secondary, tertiary amines and quaternary ammonium salt
b) primary amine only
c) primary, secondary and tertiary amines in equal amounts
d) Tertiary amine only
- Kolbe's electrolysis of potassium ethanoate leads to the formation of
a) ethene b) methane c) ethane d) ethyne
- Hydrogen atom of chloroform is acidic, but that of methane is not. The reason is
a) C - H bond is weak b) chlorine is electro negative
c) hydrogen is very active d) hydrogen partially active
- In the following sequence of reactions $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br} \xrightarrow{\text{alc.KOH}} (\text{A}) \xrightarrow{\text{HBr}} (\text{B}) \xrightarrow{\text{aq.KOH}} (\text{C})$, the product (C) is
a) propene b) 2-propanol c) 1-propanol d) propyne
- A chloro derivative A on treatment with Zn - Cu couple gives a hydro carbon with five carbon atoms. When A is dissolved in ether and treated with sodium, 2, 2, 5, 5 tetra methyl hexane is obtained. What is the original compound A?
a) n-pentyl chloride b) neopentyl chloride
c) 2-chloro pentane d) 3-chloro pentane
- In the reaction

$$\text{ROH} + \text{HX} \xrightleftharpoons[\text{ZnCl}_2]{\text{anhydrous}} \text{RX} + \text{H}_2\text{O}$$
the order of reactivity of halogen acids is
a) HI > HBr > HCl b) HI < HBr < HCl
c) HI > HBr < HCl d) HI < HBr > HCl
- $\text{CH}_3\text{OH} \xrightarrow{\text{PI}_3} (\text{A}) \xrightarrow{\text{KCN}} (\text{B}) \xrightarrow{\text{Hydrolysis}} (\text{C})$, the compound 'C' is
a) CH₃OH b) HCOOH c) CH₃CHO d) CH₃COOH
- A dihalogen derivative 'X' of a hydrocarbon with three carbon atoms reacts with alcoholic KOH and produces another hydrocarbon which forms a red precipitate with ammoniacal Cu₂Cl₂. 'X' gives an aldehyde on reaction with aqueous KOH. The compound 'X' is
a) 1,3-dichloropropane b) 1,2-dichloropropane
c) 2,2-dichloropropane d) 1,1-dichloropropane

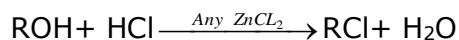
13. Among the following the most reactive towards alcoholic KOH is
 a) $\text{CH}_3\text{CH}_2\text{Br}$ b) $(\text{CH}_3)_2\text{CHBr}$ c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$ d) $\text{CH}_3\text{COCH}_2\text{CH}_2\text{Br}$
14. Which of the following compounds has the highest boiling point?
 a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Cl}$
 c) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{Cl}$ d) $(\text{CH}_3)_3\text{C}-\text{Cl}$
15. Identify Z in the series $\text{CH}_3\text{CN} \xrightarrow{\text{Na}/\text{C}_2\text{H}_5\text{OH}} \text{X} \xrightarrow{\text{HNO}_2} \text{Y} \xrightarrow{\text{alkKMnO}_4} \text{Z}$
 a) $\text{CH}_3\text{CH}_2\text{COOH}$ b) CH_3COOH c) CH_3CONH_2 d) $\text{CH}_3\text{COOCH}_3$
16. An organic halide with formula $\text{C}_6\text{H}_{13}\text{Br}$ on heating with alc. KOH gives two isomeric alkenes (A) and (B) with formula C_6H_{12} . On reductive ozonolysis of mixture (A) and (B), the following compounds are obtained.
 CH_3COCH_3 , CH_3CHO , $\text{CH}_3\text{CH}_2\text{CHO}$ and $(\text{CH}_3)_2\text{CHCHO}$
 The organic halide is
 a) 2-bromohexane b) 3-bromo-2-methylpentane
 c) 2,2-dimethyl-1-bromohexane d) 3-bromopentane
17. Decreasing order of reactivity of alkyl halide is
 a) $\text{RI} > \text{RCl} > \text{RBr}$ b) $\text{RBr} > \text{RCl} > \text{RI}$
 c) $\text{RI} > \text{RBr} > \text{RCl}$ d) $\text{RCl} > \text{RBr} > \text{RI}$
18. Compound $\text{C}_4\text{H}_8\text{Cl}_2$ (A) on hydrolysis gives a compound $\text{C}_4\text{H}_8\text{O}$ (B) which reacts with hydroxylamine and does not give any test with Tollens' reagent. What are (A) and (B)?
 a) 1, 1-Dichlorobutane and butanal b) 2, 2-Dichlorobutane and butanal
 c) 1, 1-Dichlorobutane and butan-2-one d) 2, 2-Dichlorobutane and butan-2-one
19. Hydrocarbon 'A' reacts with bromine by substitution to form an alkyl bromide which by wurtz reaction is converted to a gaseous hydrocarbon containing four C-atoms. The compound 'A' is
 a) $\text{CH}_3 - \text{CH}_2 - \text{Br}$ b) $\text{CH}_3 - \text{CH}_3$
 c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br}$ d) $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH} - \text{Br}$
20. Which one of the following is not the correct order of boiling points of alkyl/aryl halides?
 a) $\text{CHCl}_3 > \text{CH}_2\text{Cl}_2$ b) $\text{CH}_3(\text{CH}_2)_3\text{Cl} > \text{CH}_3(\text{CH}_2)_2\text{Cl}$
 c) $(\text{CH}_3)_3\text{CCl} > (\text{CH}_3)_2\text{CHCH}_2\text{Cl}$ d) $\text{CH}_3(\text{CH}_2)_3\text{Cl} > \text{CH}_3\text{CH}_2\text{CHClCH}_3$
21. In the reaction, $\text{R}-\text{Br} + \text{Cl}^- \longrightarrow \text{R}-\text{Cl} + \text{Br}^-$
 The rates of reaction of ethyl bromide (I), n-propyl bromide (II), isobutyl bromide (III) and neopentyl bromide (IV) follow the order.
 a) $\text{IV} > \text{III} > \text{II} > \text{I}$ b) $\text{I} > \text{II} > \text{III} > \text{IV}$
 c) $\text{I} > \text{III} > \text{II} > \text{IV}$ d) $\text{III} > \text{II} > \text{IV} > \text{I}$
22. The correct increasing order of reactivity of halides for $\text{S}_{\text{N}}1$ reaction
 a) $\text{CH}_3\text{CH}_2\text{X} < (\text{CH}_3)_2\text{CHX} < \text{CH}_2 = \text{CHCH}_2\text{X} < \text{PhCH}_2\text{X}$
 b) $(\text{CH}_3)_2\text{CHX} < \text{CH}_3\text{CH}_2\text{X} < \text{CH}_2 = \text{CHCH}_2\text{X} < \text{PhCH}_2\text{X}$
 c) $\text{PhCH}_2\text{X} < (\text{CH}_3)_2\text{CHX} < \text{CH}_3\text{CH}_2\text{X} < \text{CH}_2 = \text{CHCH}_2\text{X}$
 d) $\text{CH}_2 = \text{CHCH}_2\text{X} < \text{PhCH}_2\text{X} < (\text{CH}_3)_2\text{CHX} < \text{CH}_3\text{CH}_2\text{X}$
23. Neopentyl bromide is treated with $\text{CH}_3\text{CH}_2\text{ONa}/\text{CH}_3\text{CH}_2\text{OH}$, the major product formed in the reaction is
 a) $(\text{CH}_3)_3\text{C}-\text{CH}_2-\text{OCH}_2\text{CH}_3$ b) $\text{CH}_3\text{CH}_2-\text{C}(\text{CH}_3)_2-\text{OCH}_2\text{CH}_3$
 c) $(\text{CH}_3)_2\text{C} = \text{CHCH}_3$ d) $\text{CH}_3\text{CH}_2-\text{C}(\text{CH}_3) = \text{CH}_2$
24. Which of the following is an example of vic-dihalide?
 a) Dichloromethane b) 1, 2-Dichloroethane

- c) Ethylidene chloride d) Allyl chloride
25. The position of $-\text{Br}$ in the compound in $\text{CH}_3\text{CH} = \text{CHC}(\text{Br})(\text{CH}_3)_2$ can be classified as
- a) allyl b) aryl c) vinyl d) secondary
26. Under the influence of air and light chloroform decomposes into
- a) CCl_4 b) $(\text{CH}_3)_2\text{C} - \text{CCl}_3$ c) COCl_2 d) CCl_3CHO
27. Which of the following possesses highest melting point?
- a) Chlorobenzene b) *o* - Dichlorobenzene
c) *m* - Dichlorobenzene d) *p* - Dichlorobenzene
28. Which of the following will have the maximum dipole moment?
- a) CH_3F b) CH_3Cl c) CH_3Br d) CH_3I
29. Arrange the following compounds in order of increasing dipole moment:
Toluene (I), *m* - dichlorobenzene (II), *o* - dichlorobenzene (III)
p - dichlorobenzene (IV)
- a) I < IV < II < III b) IV < I < II < III
c) IV < I < III < II d) IV < II < I < III
30. C - X bond is strongest in
- a) CH_3Cl b) CH_3Br c) CH_3F d) CH_3I
- a) Longer and weaker b) Shorter and weaker
c) Shorter and stronger d) Longer and stronger
31. The reaction for preparing alkyl cyanide by reacting alkyl halide with potassium cyanide is
- a) Elimination reaction b) Electrophilic reaction
c) Nucleophilic reaction d) Condensation reaction
32. $\text{S}_{\text{N}}1$ reaction of alkyl halides leads to
- a) retention of configuration b) racemisation
c) inversion of configuration d) None of these
33. The order of reactivities of the following alkyl halides for $\text{S}_{\text{N}}2$ reaction is
- a) $\text{RF} > \text{RCI} > \text{RBr} > \text{RI}$ b) $\text{RF} > \text{RBr} > \text{RCI} > \text{RI}$
c) $\text{RCI} > \text{RBr} > \text{RF} > \text{RI}$ d) $\text{RI} > \text{RBr} > \text{RCI} > \text{RF}$
34. Which of the following is an example of $\text{S}_{\text{N}}2$ reaction ?
- a) $\text{CH}_3\text{Br} + \text{OH}^- \rightarrow \text{CH}_3\text{OH} + \text{Br}^-$
b) $\text{H}_3\text{C}-\underset{\text{Br}}{\text{CH}}-\text{CH}_3 + \text{OH}^- \longrightarrow \text{H}_3\text{C}-\underset{\text{OH}}{\text{CH}}-\text{CH}_3$
c) $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{-\text{H}_2\text{O}} \text{CH}_2 = \text{CH}_2$
d) $(\text{CH}_3)_3\text{C} - \text{Br} + \text{OH}^- \rightarrow (\text{CH}_3)_3\text{COH} + \text{Br}^-$
35. Isopropyl chloride undergoes hydrolysis by
- a) $\text{S}_{\text{N}}1$ mechanism b) $\text{S}_{\text{N}}2$ mechanism
c) $\text{S}_{\text{N}}1$ and $\text{S}_{\text{N}}2$ mechanism d) Neither $\text{S}_{\text{N}}1$ nor $\text{S}_{\text{N}}2$ mechanism
36. Butanenitrile is formed by reaction of KCN with
- a) Propyl alcohol b) Butyl chloride c) Butyl alcohol d) Propyl chloride
37. The reaction of an alkyl halide with RCOOAg produces
- a) ester b) ether c) aldehyde d) ketone
38. Which of the following compounds will give racemic mixture on nucleophilic substitution by OH^- ion?
- (I) $\text{CH}_3-\underset{\text{C}_2\text{H}_5}{\text{CH}}-\text{Br}$ (II) $\begin{array}{c} \text{Br} \\ | \\ \text{CH}_3-\text{C}-\text{CH}_3 \\ | \\ \text{C}_2\text{H}_5 \end{array}$ (III) $\text{CH}_3-\underset{\text{C}_2\text{H}_5}{\text{CH}}-\text{CH}_2\text{Br}$
- a) (I) b) (I), (II), (III) c) (II), (III) d) (I), (III)

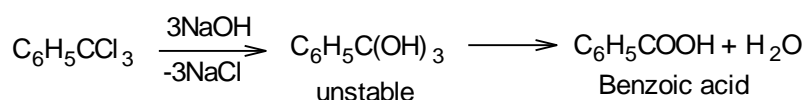
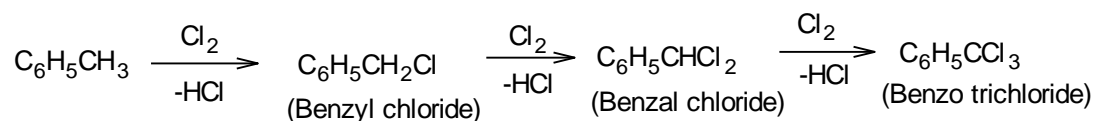
39. The reactivity order of halides for dehydrohalogenation is
 a) $R - F > R - Cl > R - Br > R - I$ b) $R - I > R - Br > R - Cl > R - F$
 c) $R - I > R - Cl > R - Br > R - F$ d) $R - F > R - I > R - Br > R - Cl$
40. Identify X and Y in the following sequence
 $C_2H_5Br \xrightarrow{X} \text{product} \xrightarrow{Y} C_3H_7NH_2$
 a) $X = KCN, Y = LiAlH_4$ b) $X = KCN, Y = H_3O^+$
 c) $X = CH_3Cl, Y = AlCl_3 / HCl$ d) $X = CH_3NH_2, Y = HNO_2$
41. On sulphonation of C_6H_5Cl
 a) m - Chlorobenzenesulphonic acid is formed
 b) Benzenesulphonic acid is formed
 c) o - Chlorobenzenesulphonic acid is formed
 d) o - and p - Chlorobenzenesulphonic acid is formed
42. Which of the following is not used in Friedel -Crafts reaction?
 a) N - Phenyl acetanilide b) Bromobenzene
 c) Benzene d) Chlorobenzene
43. Toluene on reaction with N -bromosuccinimide gives
 a) p - Bromomethylbenzene b) o - Bromomethylbenzene
 c) Phenyl bromomethane d) m - Bromomethylbenzene
44. 2, 6 - Dimethylheptane on monochlorination produces..... derivatives
 a) 5 b) 6 c) 3 d) 4
45. When chlorine is passed through propene at $400^\circ C$, which of the following is formed?
 a) PVC b) Allyl chloride
 c) Vinyl chloride d) 1,2- Dichloroethane
46. Which one of the following is most reactive towards nucleophilic substitution reaction?
 a) $CH_2 = CH - Cl$ b) C_6H_5Cl
 c) $CH_3CH = CH - Cl$ d) $ClCH_2 - CH = CH_2$
47. Pure chloroform is prepared by
 a) distilling chloral hydrate with aqueous sodium hydroxide
 b) heating ethanol with bleaching powder
 c) heating acetone with bleaching powder
 d) reducing carbon tetrachloride
48. Chloropicrin is obtained by the reaction of
 a) Chlorine on picric acid
 b) Nitric acid on chloroform
 c) Steam on carbon tetrachloride
 d) Nitric acid on chlorobenzene
49. Identify Z in the following series
 $C_2H_5I \xrightarrow{AlCl_3 / KOH} X \xrightarrow{Br_2} Y \xrightarrow{KCN} Z$
 a) CH_3CH_2CN b) $NCCH_2 - CH_2CN$
 c) $BrCH_2 - CH_2CN$ d) $BrCH = CHCN$
50. Cl_2 reacts with CS_2 in presence of I_2 to form
 a) $CHCl_3$ b) CCl_4 c) C_2H_5Cl d) $Cl_3C - NO_2$

solutions

1. Ans: (a)

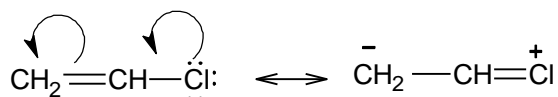


2. Ans: (c)



3. Ans: (a)

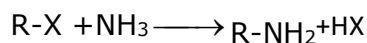
In Vinyl Chloride -Cl group is attached to unsaturated C - atom due to '+m' effect C-Cl single bond is converted to C-Cl double bond hence bond length decreases.



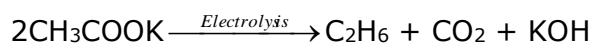
4. Ans: (d)

Due to the absence of β-Hydrogen atom

5. Ans: (b)



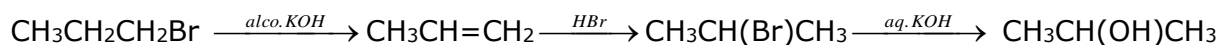
6. Ans: (c)



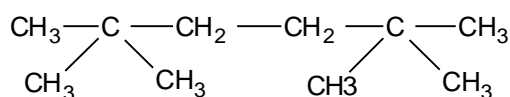
7. Ans: (b)

Due to three electronegative chlorine atom present on carbon, the latter acquires partial +ve charge and chlorine tends to attract electrons of the C - H bond towards itself. Hence the removal of hydrogen atom as proton becomes easy.

8. Ans: (b)

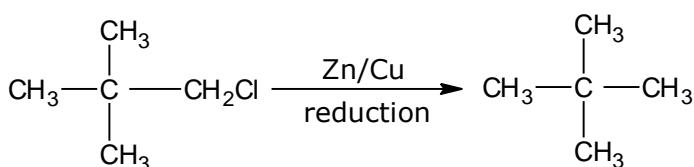
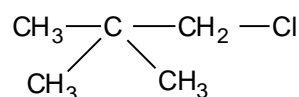


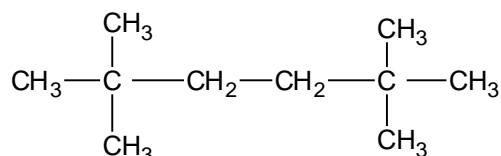
9. Ans: (b)



is formed,

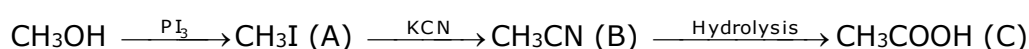
when the compound A undergoes Wurtz reaction. So the compound A is



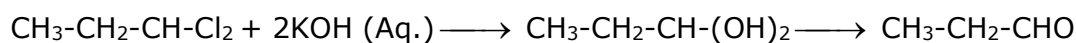
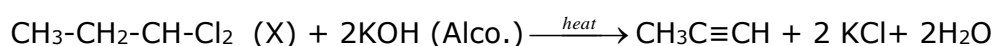


10. (a)
The stronger the acid, higher the reactivity

11. Ans: (d)



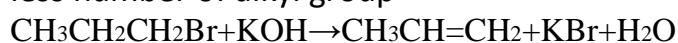
12. Ans: (d)



$\text{CH}_3\text{C}\equiv\text{CH}$ due to acidic hydrogen gives red precipitate with ammoniacal Cu_2Cl_2

13. Ans: (C)

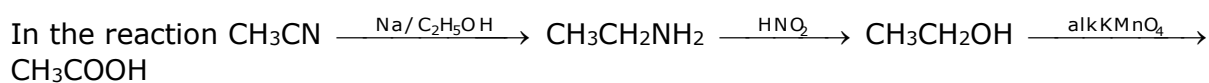
The polarity between C-X bond increases by increasing the + I effect which increase by increasing the alkyl group by which X of C-X easily eliminate In $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$ the polarity decreases due to the presence of double bond presence of CO group (-I) and less number of alkyl group



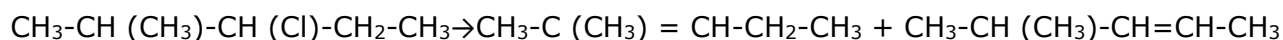
14. Ans: (b)

Among isomeric haloalkanes as the branching increases boiling point decreases .

15. Ans: (b)



16. Ans: (b)



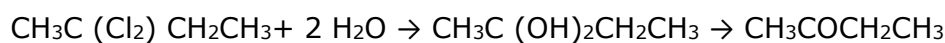
17. Ans: (c)

$\text{RI} > \text{RBr} > \text{RCl}$, as the bond strength decreases reactivity increases .

Type of bond	C-I	C-Br	C-Cl
Bond strength (Kcal/mol)	45.5	54	66.5

18. Ans: (d)

2, 2 Dichlorobutane on hydrolysis gives an unstable product , it losses a molecule of water to give 2 butanone .



19. **Ans: (b)**



Ethyl bromide on Wurtz reaction gives butane.

20. **Ans: (d)**

As the branching increases boiling point decreases

21. **Ans: (c)**

22. **Ans: (a)**

Reactivity depends on stability of carbocation, benzyl > allyl > isopropyl > ethyl

23. **Ans: (c)**

Neopentyl bromide undergoes dehydrohalogenation to give isobutylene.

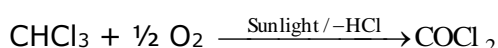
24. **Ans: (b)**

In vicinal dihalides, halogen atoms are present on the adjacent carbon atoms.

25. **Ans: (a)**

Allylic halides are the compounds in which the halogen atom is bonded to an sp^3 -hybridised carbon atom next to carbon-carbon double bond ($\text{C}=\text{C}$) i.e. to an allylic carbon.

26. **Ans: (c)**



Phosgene

27. **Ans: (d)**

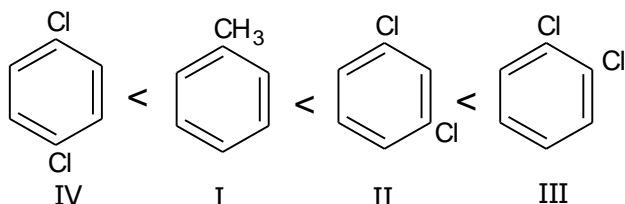
Due to its symmetrical structure, p-dichlorobenzene fits closely in the crystal lattice.

28. **Ans: (b)**

CH_3Cl has a higher dipole moment than CH_3F due to the much longer C-Cl bond length than the C-F bond. The much longer bond length of the C-Cl bond outweighs the effect produced by the lower electronegativity of Cl than that of F.

29. **Ans: (b)**

In p-dichlorobenzene, the two equal dipoles are in opposite directions, hence the molecule has zero dipole moment. In o- and m-dichlorobenzenes, the two dipoles are at 60° and 120° apart respectively, and thus according to the parallelogram law of vector addition, the dipole moment of o-dichlorobenzene is much higher than that of the m-isomer. Lastly, toluene with a +1 group possesses a small dipole moment. Thus the overall order is



30. **Ans: (c)**

Because of the small size of F, the C-F bond is the strongest in CH_3F .

31. **Ans: (c)**

K^+CN^- is a nucleophilic reagent.

32. **Ans: (b)**

$\text{S}_{\text{N}}1$ reaction involves carbocations which are planar (sp^2 hybridised) and thus can be attacked on either face of the carbon.

33. **Ans: (d)**

Weaker the C-X bond, greater is the reactivity.

34. **Ans: (a)**

Only 1° alkyl halides (i.e. CH_3Br) undergo $\text{S}_{\text{N}}2$ reaction.

35. **Ans: (c)**

Isopropyl chloride, being a 2° alkyl halide, can undergo $\text{S}_{\text{N}}1$ as well as $\text{S}_{\text{N}}2$ mechanism.

36. **Ans: (d)**

- Butanenitrile is $\text{CH}_3\text{CH}_2\text{CH}_2\text{CN}$ hence will be prepared from $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ (propyl chloride) and not butyl chloride.
37. **Ans:(a)** $\text{RCOOAg} + \text{XR}' \rightarrow \text{RCOOR}' + \text{AgX}$.
38. **Ans:(a)**
In compound (I), Br is directly attached to chiral C atom thus, will give racemic mixture on nucleophilic substitution ($\text{S}_{\text{N}}1$) by OH^- ion.
39. **Ans:(b)**
Order of reactivity of alkyl halides (having same value of R) towards substitution/dehydrohalogenation follow the same order, i.e.
 $\text{R} - \text{I} > \text{R} - \text{Br} > \text{R} - \text{Cl} > \text{R} - \text{F}$
40. **Ans: (a)**
41. **Ans:(d)**
-Cl is o, p- directing.
42. **Ans:(a)**
N- Phenylacetanillide, $\text{C}_6\text{H}_5\text{N}(\text{C}_6\text{H}_5)\text{COCH}_3$, precipitates out to a complex with anhydrous AlCl_3 .
43. **Ans:(c)**
Allylic bromination by NBS (free-radical reaction).
- 44 **Ans:(d)**
There are four types of hydrogen hence it gives four product.
45. **Ans:(b)**
At high temperature, propene undergoes substitution, rather than addition, with chlorine.
46. **Ans:(d)**
More the stability of the carbocation, higher will be the reactivity of the parent chloride.
Allyl chloride > Vinyl chloride > Chlorobenzene
47. **Ans:(a)**
 $\text{Cl}_1\text{CCH}(\text{OH})_2 + \text{NaOH} \rightarrow \text{CHCl}_3 + \text{HCOONa} + \text{H}_2\text{O}$
48. **Ans:(b)**
 $\text{CHCl}_3 + \text{HNO}_3 \longrightarrow \text{C}(\text{NO}_2)\text{Cl}_3$
49. **Ans:(b)**
 $\text{C}_2\text{H}_5\text{I} \xrightarrow{\text{alcKOH}} \text{CH}_2 = \text{CH}_2 \xrightarrow{\text{Br}_2} \text{BrCH}_2 - \text{CH}_2\text{BR} \xrightarrow{\text{KCN}} \text{CNCH}_2.\text{CH}_2\text{CN}$
50. **Ans:(b)**
 $\text{CS}_2 + 3\text{Cl}_2 \longrightarrow \text{CCl}_4 + \text{S}_2\text{Cl}_2$