Holiday Homework

Class—XII

Chemistry (2026-27)

1) Make a list of all name reactions from the chapters (a) Haloalkanes and Haloarenes (b) Alcohol, Phenols and Ethers in alphabetical order and write them in your Chemistry register neatly.

2). Read newspaper daily to extract scientific information and also to know what is happening around us.

3). Complete your investigatory project (except the observation part) which you have already been allotted in the class.

The project file should contain pages in the following order:

(a) Certificate (b) Acknowledgement (c) Aim of the project (d) Introduction (e) Theory (f) Apparatus required (g) Procedure (h) Observation (i) Conclusion (j) Precaution (k) Bibliography

4) PYQs (Organic Chemistry)

Haloalkanes and Haloarenes

(a). Among the isomeric alkanes of molecular formula C_5H_{12}, identify the one that on photochemical chlorination yields **(CBSE (F) 2017)**

(i) A single monochloride

(ii) Three isomeric monochlorides

(iii) Four isomeric monochlorides

(b) The treatment of alkyl halide with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH , alkenes are major products. Explain. **(HOTS)**

(c) Primary alkyl halide C_4H_9Br (a) reacted with alcoholic KOH to give compound (b). Compound(b) is reacted with HBr to give (c). which is an isomer of (a). When (a) is reacted with sodium metal, it gives compound(d). C8H18 which is different from the compound formed when

n-butyl bromide is reacted with sodium. Give the structural formula of (a) and write the equations for all the reactions. **(HOTS)**

(d) Which of the following contains sp2 hybridised carbon bonded to X?

(i) CH_2=CH—CH_2—X (ii) Ar—CH_2—X

(iii) CH_2=CH—X (iv) CH_3—CH_2--X

(CBSE sample paper 2024)

(e) Which of the following is an example of vic-dihalide?

(i) Dichloromethane (ii) 1,2-dichloroethane

(iii) Ethylidene chloride (iv) Allyl Chloride

(NCERT Exemplar)

(f) Consider the following reaction:

CH_3—CH=CH_2 in the presence of HBr and aq. KOH

The major end product is

(i). CH_3—CH(OH)—CH_3 (ii) CH_3—CH(Br)—CH_3

(iii) CH_3-CH_2-CH_2-OH (iv) CH_3-CH_2-CH_2-Br

(CBSE 2022(56/3/4)

(g) The synthesis of alkyl fluoride is best obtained from:

(i) Free radicals (ii) Swarts reaction

(iii) Sandmeyer reaction (iv) Finkelstein reaction

(CBSE 2023 (56/1/1)

(h) Chlorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?

(i) Cl^- (ii) Cl^+ (iii) $AlCl_3$ (iv) $[AlCl_4]^-$

(NCERT Exemplar)

(i). Two possible stereo-structure of CH_3-CH(OH)COOH which are optically active are called **(CBSE 2023 (56/2/1)**

(i) Mesomers (ii) Enantiomers

(iii) Diastereomers (iv) Isomers

(j) Major product obtained on reaction of 3-Phenyl propene with HBr in the presence of peroxide

(i) 3-Phenyl-1-bromopropane (ii) 1-Phenyl-3-bromopropane

(iii) 1-Phenyl-2-bromopropane (iv) 3-Phenyl-2-bromopropane

(CBSE Sample paper 2022)

(k) Assertion(A):- Alkyl halides are insoluble in water.

Reason(R) :- Alkyl halides have halogen attached to sp^3 hybrid carbon **(CBSE Sample paper 2022)**

(l) Assertion(A):- Nucleophilic substitution of iodoethane is easier than chloroethane.

Reason(R):- Bond enthalpy of C—I bond is less than that of C—Cl bond. **(CBSE 2023 (56/2/1)**

(m) Assertion(A);- Chlorobenzene is less reactive towards nucleophilic substitution reaction.

Reason(R):- Nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.

(CBSE Sample paper 2021(56/3/4)

(n) Write the major product in the following:

$Ar—CH_2CH_3$ in the presence of Cl_2, UV light (Ar is benzene ring) **(CBSE 2024 (56/2/1)**

(o) Explain why electrophilic substitution reactions in haloarenes occur slowly and require more drastic conditions as compared to those in benzene. **(CBSE Simple paper 2024)**

(p) Out of chlorobenzene and cyclohexyl chloride, which one is more reactive towards nucleophilic substitution reactions and why?

(CBSE 2019(56/2/1)

(q) An alkyl halide (A) of molecular formula $C_6H_{13}Cl$ on treatment with alcoholic KOH gives two isomeric alkenes (B) and (C) of molecular

formula C_6H_{12}. Both alkenes on hydrogenation gives 2,3-dimethyl butane. Write the structures of (A) , (B) and (C).

(CBSE 2023 (56/4/2)

(r) Give reasons:

(a) C-Cl bond length in chlorobenzene is shorter than C-Cl bond length in CH_3-Cl.

(b) SN1 reactions are accompanied by racemisation.

(CBSE Delhi 2016)

(s) Out of SN1 and SN2 , which reaction occurs with

(i) Inversion of configuration (ii) Racemisation

(CBSE Delhi 2014)

(t) How will you distinguish between the following pairs:

(a) Chlorobenzene and CCl_4 (b) Benzyl Chloride and chlorobenzene. **(CBSE Sample Paper 2014)**

(u) Write equations for the following:

(i) Oxidation of chloroform by air and light

(ii) Reaction of chlorobenzene with CH_3Cl / anhyd. $AlCl_3$

(CBSE 2023 (56/5/2)

(v) How do you convert the following:

(i) Prop-1-ene --→ flouropropane

(ii) Chlorobenzene to 2-Chloropropane

(iii) Ethanol to propanenitrile **(CBSE Panchkula 2015)**

(w) Write the main product formed when:

(i) Methyl Chloride is treated with NaI/Acetone

(ii) 2,4,6-trinitrochlorobenzene is subjected to hydrolysis .

(iii) n- Butyl chloride is treated with alcoholic KOH.

(CBSE 2023 (56/1/1)

(x) Give reasons for the following observations:

(i) p-dichlorobenzene has higher melting point than those of o- and m-isomers.

(ii) Haloarenes are less reactive than haloalkanes towards nucleophilic substitution reaction.

(iii) The treatment of alkyl chloride with aqueous KOH leads to the formation of alcohol but in the presence of alcoholic KOH, alkene is the major product. **(CBSE 2019 (56/4/1)**

(y) Give reasons:

(i) n-Butyl bromide has higher boiling point than t-butyl bromide.

(ii) Racemic mixture is optically inactive.

(iii) The presence of nitro group (---NO_2) at o/p positions increases the reactivity of haloarenes towards nucleophilic substitution reactions.

(CBSE Delhi 2015; 2019 (56/4/1)

Alcohols, Phenols and Ethers

(a) Give the equations for the preparation of phenol from cumene.

(CBSE 2020 (56/3/2)

(b) Write the chemical reaction for the preparation of phenol from chlorobenzene. **(CBSE 2019 (56/4/2), 2020 (56/5/1)**

(c) Write the mechanism of acid catalysed dehydration of ethanol to yield ethene. **(CBSE 2019 (56/4/1, 2020 (56/1/1)**

(d) Name the reagents used in the following reactions:

(i) Oxidation of primary alcohol to carboxylic acid

(ii) Oxidation of a primary alcohol to aldehyde

(iii) Bromination of phenol to 2, 4, 6-tribromophenol

(iv) Benzyl alcohol to benzoic acid

(v) Dehydration of propan-2-ol to propene

(vi) Butan-2-one to butan-2-ol **(CBSE (F) 2014)**

(e) Write the names of reagents and equations for the preparation of the following ethers by Williamson's synthesis:

(i) 1-Propoxypropane (ii) Ethoxy benzene

(iii) 2-methoxy-2-methylpropane (iv) 1-Methoxyethane

(CBSE 2020 (56/4/2)

(f) Ethanol on heating with conc. H_2SO_4 at 413 K gives:

(i) $C_2H_5OSO_3H$ (ii) C_2H_5---O---CH_3

(iii) C_2H_5---O---C_2H_5 (iv) $CH_2 = CH_2$ **(CBSE 2024 (56/2/1)**

(g) Anisole undergoes bromination with bromine in ethanoic acid even in the absence of iron (III) bromide catalyst

(i) Due to the activation of benzene ring by the methoxy group

(ii) Due to the de-activation of benzene ring by the methoxy group

(iii) Due to the increase in electron density at ortho and para positions

(iv) Due to the formation of stable carbocation

(CBSE Sample Paper 2024)

(h) The C—O—H bond angle in alcohol is

(i) Slightly greater than 109°28' (ii) Slightly less than 109°28'

(iii) Slightly greater than 120° (iv) Slightly less than 109°

(CBSE 2022 (56/3/4)

(I) Which of the following alcohols will not undergo oxidation?

(i) Butanol (ii) Butan-2-ol

(iii) 2-Methylbutan-2-ol (iv) 3-Methylbutan-2-ol **(CBSE 2023 (56/5/2)**

(j) During dehydration of alcohols to alkenes on heating with conc. H_2SO_4, the initiation step is:

(i) protonation of alcohol molecule (ii) formation of carbonation

(iii) elimination of water (iv) formation of an ester

(CBSE Sample Paper 2022)

(k) Williamson's synthesis of preparing dimethyl ether is an:

(i) SN1 reaction (ii) Elimination reaction

(iii) SN2 reaction (iv) Nucleophilic addition reaction

(CBSE Sample Paper 2022)

(l) Assertion(A);- C_2H_5OH is a weaker base than phenol but is a stronger nucleophile than phenol.

Reason(R):- In phenol the lone pair of electrons on oxygen is withdrawn towards the ring due to resonance.

(CBSE Sample paper 2020)

(m) Assertion(A);- o-nitrophenol is a weaker acid than p-nitrophenol.

Reason(R):- Intramolecular hydrogen bonding makes ortho isomer weaker than para isomer. **(CBSE 2020 (56/2/1)**

(n) Assertion(A);- The C—O—H bond angle in alcohols is slightly less than the tetrahedral angle.

Reason(R):- This is due to the repulsive interaction between the two lone electron pair on oxygen. **(CBSE 2020 (56/3/1)**

(o) (i) Why ortho-nitrophenol is steam volatile while para-nitrophenol is not?

(ii) Write IUPAC name of the following compound:

$CH_3—C(CH_3) = C(Br)—CH_2\text{-}OH$

(CBSE 2023(56/2/1) , (CBSE (AI) 2017)

(p) (i) Arrange the following compounds in the increasing order of their acidic strength:

4- Nitrophenol , Phenol , 2,4,6-Trinitrophenol

(ii) Phenol is an acid but does not react with baking soda. Why?

(CBSE (F) 2013) (HOTS)

(q) How is toluene obtained from phenol?

(CBSE Delhi 2013)

(r) Write the mechanism of :-" Preparation of Diethyl ether from Ethanol".

(CBSE Delhi 2016, 2019(56/4/3) , 2020 (56/3/2)

(s) For the pair phenol and cyclohexanol, answer the following:

(i) Why is phenol more acidic than cyclohexanol?

(ii) Give one chemical test to distinguish between the two.

(CBSE 2023 (56/5/2)

(t) What happens when

(i) Phenol reacts with Conc. HNO_3 (ii) C_2H_5Cl reacts with C_2H_5ONa

(CBSE 2019 (56/4/3)

(u) Give one chemical test to distinguish between the following:

(i) Phenol and Propan-1-ol (ii) Ethanol and Dimethyl ether

(iii) Propan-1-ol and 2-Methylpropan-2-ol.

(CBSE 2019 (56/5/1)

(v) The following is not an appropriate method for the preparation of tert-butyl ethyl ether:

$$C_2H_5\ ONa + (CH_3)_3\ C—Cl \dashrightarrow (CH_3)_3\ C—OC_2H_5$$

(i). What would be the major product of the above reaction?

(ii) Write a suitable reaction for the preparation of tert-butyl ethyl ether , specifying the names of reagents used. Justify your answer in both the cases. **(CBSE Sample paper 2016) HOTS**

All the above questions are taken from the CBSE Sample papers of past few years , some HOTs and some from Exemplar. Must attempt all the questions in your chemistry register and practice the mechanism, reactions and conversions 3-4 times to become perfect.