QUESTION BANK
UNIT-10 HALOALKANES & HALOARENES
CLASS-12 (CBSE)

S. No.	Questions	Year
1.	The substitution reaction of alkyl halide mainly occurs by S_N1 or S_N2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of S_N1 reactions are governed by the stability of carbocation whereas for S_N2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed. 1. Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by S_N1 mechanism. 2. Name the instrument used for measuring the angle by which the plane polarised light is rotated. 3. Predict the major product formed when 2-Bromopentane reacts with alcoholic KOH. 4. Give one use of CHI_3. 5. Write the structures of the products formed when anisole is treated with HI.	2020
2.	The substitution reaction of alkyl halide mainly occurs by S_N1 or S_N2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of S_N1 reactions are governed by the stability of carbocation whereas for S_N2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed. 1. Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by S_N2 mechanism. 2. Write the structures of the products formed when anisole is treated with HI. 3. Predict the major product formed when 2-Bromobutane undergoes a reaction with alcoholic KOH. 4. Name the instrument used for measuring the angle by which the plane polarised light is rotated. 5. Give one use of CHI_3.	2020
3.	The substitution reaction of alkyl halide mainly occurs by S_N1 or S_N2 mechanism. Whatever mechanism alkyl halides follow for the substitution reaction to occur, the polarity of the carbon halogen bond is responsible for these substitution reactions. The rate of S_N1 reactions are governed by the stability of carbocation whereas for S_N2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Cleavage of ethers with HI is also governed by steric factor and stability of carbocation, which indicates that in organic chemistry, these two major factors help us in deciding the kind of product formed. 1. Predict the stereochemistry of the product formed if an optically active alkyl halide undergoes substitution reaction by S_N1 mechanism. 2. What is plane polarised light? 3. Write the structures of the products formed when ethoxybenzene is treated with HI. 4. Predict the major product formed when 2-Bromopentane reacts with alcoholic KOH. 5. Give one use of CHI_3.	2020
4.	Justify and arrange the following compounds of each set in increasing order of reactivity towards the asked displacement : (a) 1-Bromobutane, 2-Bromobutane, 2-Bromo-2-Methylpropane (S_N1 reaction) (b) 1-Bromobutane, 2-Bromobutane, 2-Bromo-2-Methylpropane (S_N2 reaction)	2020
5.	Justify and arrange the following compounds namely	2020

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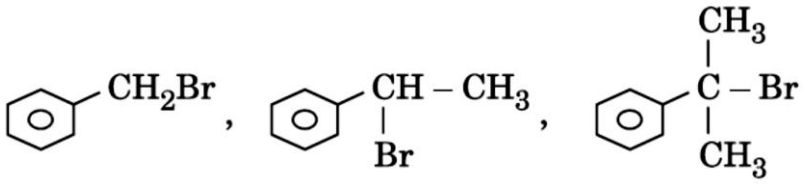
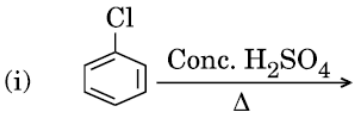
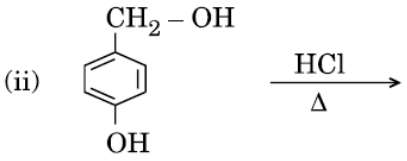
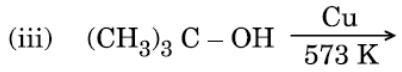
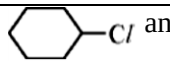
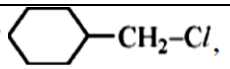
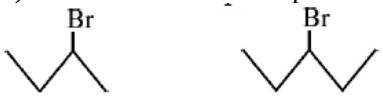
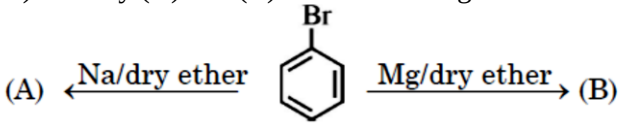
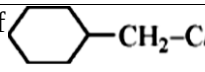
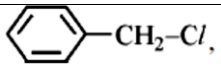
	 in increasing order of reactivity towards the asked displacement namely : (a) S_N1 (b) S_N2	
6.	Justify and arrange the following compounds namely, ethyl chloride, isopropyl chloride, tertiary butyl chloride in increasing order of reactivity towards the asked displacement namely (a) S_N1 (b) S_N2	2020
7.	Write the major product(s) of the following reactions :   	2020
8.	Out of *o*-dichlorobenzene and *p*-dichlorobenzene, which has higher melting point ?	2020
9.	Write the name of the product when benzene diazonium chloride is treated with KI.	2020
10.	Out of  and ,  which one is more reactive towards S_N1 reaction?	2020
11.	(i) Write the structure of major alkene formed by β-elimination of 2, 2, 3–trimethyl–3–bromopentane with sodium ethoxide in ethanol. (ii) Which one of the compounds in the following pairs is chiral?  (iii) Identify (A) and (B) in the following : 	2020
12.	Out of  and  which will react faster in S_N1 reaction with OH^-?	2020 2019 2018
13.	Out of $CH_3CH_2CH_2Cl$ and $CH_2=CH–CH_2–Cl$, which one is more reactive towards S_N1 reaction?	2020
14.	Identify A, B, C, D, E and F in the following :	2020

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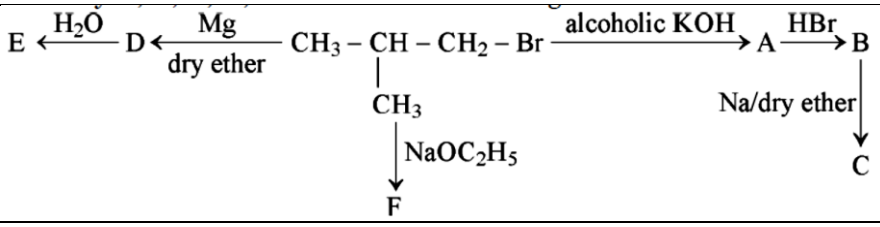
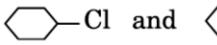
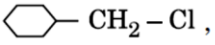
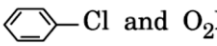
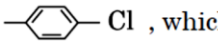
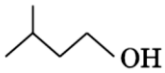
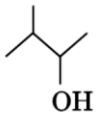
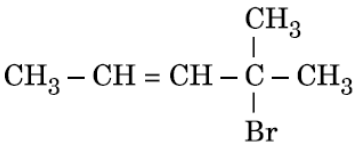
		
15.	(i) Out of $(CH_3)_3C–Br$ and $(CH_3)_3C–I$, which one is more reactive towards S_N1 and why? (ii) Write the product formed when p-nitrochlorobenzene is heated with aqueous NaOH at 443 K followed by acidification. (iii) Why dextro and laevo – rotatory isomers of Butan-2-ol are difficult to separate by fractional distillation?	2019
16.	Write one stereochemical difference between S_N1 and S_N2 reactions.	2019
17.	Out of Chlorobenzene and p-nitrochlorobenzene, which one is more reactive towards nucleophilic substitution reaction and why ?	2019
18.	Among all the isomers of molecular formula C_4H_9Br, identify (a) the one isomer which is optically active. (b) the one isomer which is highly reactive towards S_N2. (c) the two isomers which give same product on dehydrohalogenation with alcoholic KOH.	2019
19.	Why is chloroform kept in dark coloured bottles?	2019
20.	(a) Out of  and  , which one is more reactive towards S_N2 reaction and why ? (b) Out of  and  , which one is more reactive towards nucleophilic substitution reaction and why ? (c) Out of  and  , which one is optically active and why ?	2019
21.	Why is $CH_2 = CH – CH_2 – Cl$ more easily hydrolysed than $CH_3 – CH_2 – CH_2 – Cl$?	2019
22.	Why is t-butyl bromide more reactive towards SN1 reaction as compared to n-butyl bromide ?	2019
23.	(a) Write equation for preparation of 1-iodobutane from 1-chlorobutane. (b) Out of 2-bromopentane, 2-bromo-2-methylbutane and 1-bromopentane, which compound is most reactive towards elimination reaction and why ? (c) Give IUPAC name of 	2019
24.	Give reasons for the following : (a) The presence of $–NO_2$ group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution reactions. (b) p-dicholorobenzene has higher melting point than that of ortho or meta isomer. (c) Thionyl chloride method is preferred for preparing alkyl chloride from alcohols.	2019
25.	Which alkyl halide from the following pair would you expect to react more rapidly by an SN_2 mechanism?	2019

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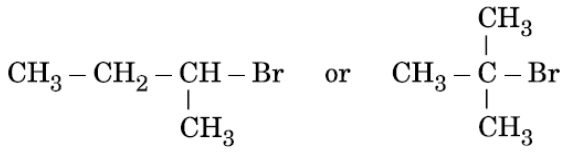
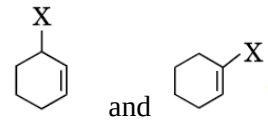
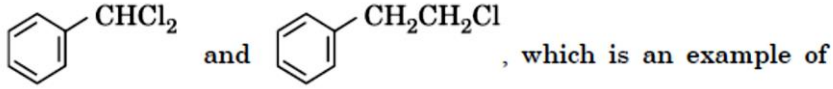
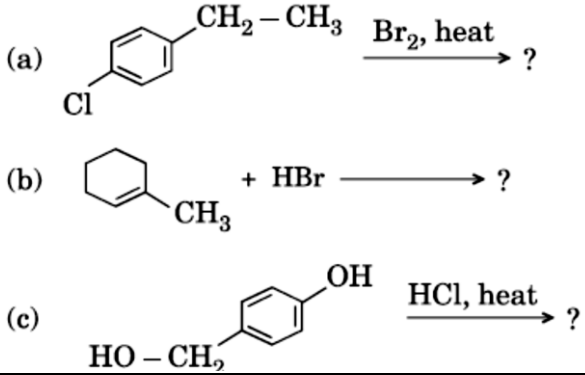
		
26.	(a) Define the following terms : (i) Enantiomers (ii) Racemic mixture (b) Why is chlorobenzene resistant to nucleophilic substitution reaction?	2019
27.	(a) Identify the chiral molecule in the following pair :  (b) Write the structure of the product when chlorobenzene is treated with methyl chloride in the presence of sodium metal and dry ether. (c) Write the structure of the alkene formed by dehydrohalogenation of 1-bromo-1-methylcyclohexane with alcoholic KOH.	2018(OD)
28.	 Out of and , which is an example of allylic/vinylic halide?	2017(OD)
29.	The following compounds are given to you : 2-Bromopentane, 2-Bromo-2-methylbutane, 1-Bromopentane (a) Write the compound which is most reactive towards S_N2 reaction. (b) Write the compound which is optically active. (c) Write the compound which is most reactive towards β-elimination reaction.	2017(OD) 2017(D)
30.	 Out of and , which is an example of a benzylic halide ?	2017(OD)
31.	Among the isomers of pentane (C_5H_{12}), write the one which on photochemical chlorination yields a single monochloride.	2017(F)
32.	Draw the structures of the major monohalo product for each of the following reactions: 	2017(F)
33.	Write the structure of an isomer of compound **C_4H_9Br** which is most reactive towards **S_N1** reaction	2016 (OD)
34.	How do you convert: (i) Chlorobenzene to biphenyl (ii) Propene to 1-iodopropane (iii) 2-bromobutane to but-2-ene	2016 (OD)
35.	Write the major product (s) in the following:	2016 (OD)

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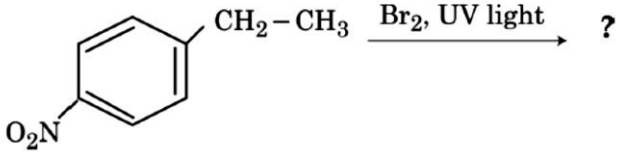
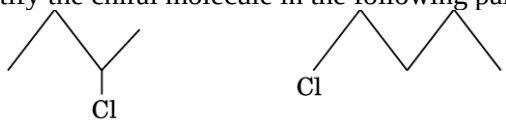
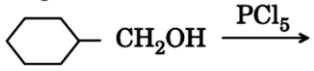
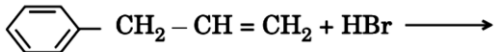
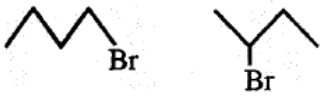
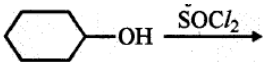
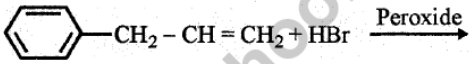
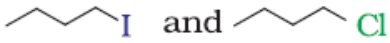
	(i)  (ii) $2CH_3-\underset{\underset{Cl}{|}}{CH}-CH_3 \xrightarrow[\text{dry ether}]{Na}$ (iii) $CH_3-CH_2-Br \xrightarrow{AgCN}$?	
36.	Out of $\mathbf{CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-Cl}$ and $\mathbf{CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-Cl}$,which is more reactive towards $\boldsymbol{S_N1}$ Reaction and why?	2016(D)
37.	Give reasons: (i) $\boldsymbol{C-Cl}$ bond length in chlorobenzene is shorter than $\boldsymbol{C-Cl}$ bond length in $\boldsymbol{CH_3-Cl}$ (ii) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride. (iii) $\boldsymbol{S_N1}$ reactions are accompanied by racemization in optically active alkyl halides.	2016(D)
38.	Which would undergo $\boldsymbol{S_N1}$ reaction faster in the following pair: $C_6H_5-CH_2-CH_2-Br$ and $C_6H_5-\underset{\underset{Br}{|}}{CH}-CH_3$	2015(OD)
39.	How can the following conversions be carried out: (i) Aniline to bromobenzene (ii) Chlorobenzene to 2-chloroactophenone (iii) Chloroethane to butane	2015(OD)
40.	What happen when? (i) Chlorobenzene is treated with $\boldsymbol{Cl_2/FeCl_3}$. (ii) Ethyl chloride is treated with $\boldsymbol{AgNO_2}$. (iii) 2-bromopentane is treated with alcoholic KOH? Write the chemical equation in support of your answer.	2015(OD)
41.	Which would undergo $\boldsymbol{S_N2}$ reaction faster in the following pair and why? $\mathbf{CH_3-CH_2-Br}$ **and** $CH_3-\underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$	2015(D)
42.	Give reasons: (a) n-Butylbromide has higher boiling point than t-butyl bromide. (b) Racemic mixture is optically inactive. (c) The presence of nitro group ($-\boldsymbol{NO_2}$) at o/p positions increases the reactivity of haloarenes towards nucleophilic substitution reactions.	2015(D)
43.	Identify the chiral molecule in the following pair: 	2014(OD)
44.	(a) Draw the structures of major monohalo products in each of following reactions:	2014(OD)

	(i)  (ii)  (b) Which halogen compound in each of the following pairs will react faster in S_N2 reaction: (*i*) CH_3Br *or* CH_3I. (*ii*) $(CH_3)_3C{-}Cl$ *or* $CH_3{-}Cl$.	
45.	(i)Which alkyl halide from the following pair is chiral and undergoes faster S_N2 reaction?  (ii) Out of S_N1 and S_N2 which reaction occurs with (a) Inversion of configuration (b) Racemization	2014(D)
46.	Draw the structure of major monohalo product in each of the following reactions: (i)  (ii) 	2014(D)
47.	Give reasons for the following: (i) Ethyl iodide undergoes S_N2 reaction faster than ethyl bromide. (ii) (±)2-Butanol is optically inactive. (iii) C-X bond length in halobenzene is smaller than C-X bond length in $CH_3 - X$.	2013(OD)
48.	What happens when $CH_3{-}Br$ is treated with KCN?	2013(D)
49.	Chlorobenzene is extremely less reactive towards a nucleophilic substitution reaction. Give two reasons for the same.	2013(D)
50.	What happens when bromine attacks $CH_2 = CH - CH_2 - C \equiv CH$?	2012(OD)
51.	Answer the following questions: (i) What is meant by chirality of a compound? Give an example. (ii) Which one of the following compounds is more easily hydrolyzed by KOH and why? $CH_3CHClCH_2CH_3$ **or** $CH_3CH_2CH_2Cl$ (iii) Which one undergoes S_N2 substitution reaction faster and why? 	2012(OD)
52.	Although chlorine is an electron withdrawing group, yet it is ortho-, para-directing in electrophilic aromatic substitution reactions. Explain why it is so?	2012(D)
53.	Rearrange the compounds of each of the following sets in order of reactivity towards displacement: (i) 2-Bromo-2-methylbutane, 1-Bromopentane, 2-Bromopentane. (ii) 1-Bromo-3-methylbutane, 2-Bromo-2-methylbutane, 3-Bromo-2-methylbutane (iii) 1-Bromobutane, 1-Bromo-2, 2-dimethylpropane, 1-Bromo-2-methylbutane	2011(OD)
54.	Answer the following: (i) Halo alkanes easily dissolve in organic solvents, why? (ii) What is known as a racemic mixture? Give an example. (iii) Of the two bromoderivatives, $C_6H_5CH(CH_3)Br$ **and** $C_6H_5CH(C_6H_5)Br$, which one is more reactive in S_N1 substitution reaction and why?	2011(D)