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Chapter 1 : CBSE Class 12 Chemistry Notes : Haloalkanes and Haloarenes | AglaSem Schools

NCERT Solutions For Class 12 Chemistry Chapter 10 Haloalkanes and Haloarenes. NCERT Solutions CBSE Sample Papers Chemistry Class 12 Chemistry NCERT IN TEXT QUESTIONS. Write structures of the following compounds.

The replacement of hydrogen atoms in hydrocarbon, aliphatic or aromatic compounds, by halogen atoms results in the formation of alkyl halide haloalkane and aryl halide haloarene, respectively. Class 12 Chemistry NCERT chapter, Haloalkanes and Haloarenes, explains the chemistry of these compounds including their classification, nomenclature, structures and properties. Various name reactions are also involved in this chapter which are very important for boards as well as competitive exams. Some of these reactions are: It includes a number of questions based on the structures of different halo compounds and also on the important name reactions. Solving the NCERT Exemplar problems for class 12 chapter- Haloalkanes and Haloarenes will help students to analyse that how well they have grasped the concepts and theories explained in this chapter. Class 12 Haloalkanes and Haloarenes: All the questions have been solved in the most appropriate and simple way. To help students easily understand the concepts involved in a solution, structures and chemical equations have been used appropriately wherever required. The NCERT Exemplar solutions provided here will prove to be an irreplaceable source of study while preparing for the board exams as well as for the entrance tests. Few problems along with their solutions from this chapter are given below: In gem-dihalides, halogen atoms are present on the same carbon atom. They are known as alkylidene halides. In allylic halides, halogen atom is bonded to sp^3 hybridised carbon atom next to carbon-carbon double bond. In vinylic halides, halogen atom is bonded to sp^2 hybridised carbon atom of a carbon-carbon double bond. Which of the following statements are correct about the mechanism of this reaction? In SN_2 mechanism SN_1 mechanism, a stable carbocation will be formed as an intermediate. Why is their use banned in India and other countries? They are banned in India because they are non-biodegradable. Instead, they get deposited and stored in fatty tissues. If this ingestion continues at a steady rate, DDT builds up within the animal over time. This will affect the reproductive system of animals. If animals including humans are exposed to high levels of benzene hexachloride then it may cause acute poisoning. Apart from that this BHC may affect liver functioning in humans.

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Chapter 2 : Haloalkanes and Haloarenes NCERT Solution for CBSE Class 12 - Extramarks

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In order for a haloalkane to dissolve in water, energy is required to overcome the attractions between the haloalkane molecules and break the hydrogen bonds between water molecules. However Haloalkanes are not able to form hydrogen bonds with water and therefore, less energy is released when new attractions are set up between the haloalkane and the water molecules because these are not as strong as the original hydrogen bonds in water molecules. As a result, solubility of haloalkanes in water is low. With the increase in number of carbon atoms, the densities go on increasing. With the increase in number of halogen atoms, the densities go on increasing. The densities increase in the order: Due to the polarity as well as higher molecular mass as compared to the parent hydrocarbon, the intermolecular forces of attraction dipole-dipole and van der Waals between the molecules are stronger in halogen derivatives of alkanes. As a result melting and boiling points of chlorides, bromides and iodides are considerably higher than those of the parent hydrocarbon of comparable molecular mass. This is because with the increase in the size of the halogen, the magnitude of van der Waals force increase. In general, the boiling points of chloro, bromo and iodo compounds increase with increase in the number of halogen atoms. For the same halogen atom, the boiling points of haloalkanes increase with increase in the size of alkyl groups. For isomeric alkyl halides, the boiling points decrease with branching. This is because branching of the chain makes the molecule more compact and, therefore, decrease the surface area. Due to decrease in surface area, the magnitude of van der Waals forces of attraction decreases and consequently, the boiling points of the branched chain compound is less than those of the straight chain compounds. Physical Properties of Haloarenes: These are generally colourless liquids or crystalline solids. These are heavier than water. Melting and boiling points of haloarenes i. Melting and boiling points of haloarenes are nearly the same as those of alkyl halides containing the same number of carbon atoms. The boiling points of monohalogen derivatives of benzene are in the order: For the same halogen atom, the melting and boiling points increase as the size of the aryl group increases. The melting point of para isomer is quite higher than that of ortho or meta isomers. This is due to the fact that it has symmetrical structure and therefore, its molecules can easily pack loosely in the crystal lattice. As a result intermolecular forces of attraction are stronger and therefore, greater energy is required to break its lattice and it melts at higher temperature. Chemical properties of haloalkanes: Mechanism of Nucleophilic Substitution Reaction:

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Chapter 3 : NCERT Class 12 Chemistry Solutions Haloalkanes and Haloarenes

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The treatment of alkyl chlorides with aqueous KOH leads to the formation of alcohols but in the presence of alcoholic KOH, alkenes are major products. OH^- ion is a strong nucleophile, which leads the alkyl chloride to undergo a substitution reaction to form alcohol. OH^- ion is a much weaker base than RO^- ion. Also, OH^- ion is highly solvated in an aqueous solution and as a result, the basic character of OH^- ion decreases. 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, C_8H_{18} 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. There are two primary alkyl halides having the formula, $\text{C}_4\text{H}_9\text{Br}$. They are n-butyl bromide and isobutyl bromide. Therefore, compound a is either n-butyl bromide or isobutyl bromide. Now, compound a reacts with Na metal to give compound b of molecular formula, C_8H_{18} , which is different from the compound formed when n-butyl bromide reacts with Na metal. Hence, compound a must be isobutyl bromide. Thus, compound d is 2,5-dimethylhexane. It is given that compound a reacts with alcoholic KOH to give compound b. Hence, compound b is 2-methylpropene. Also, compound b reacts with HBr to give compound c which is an isomer of a. Hence, compound c is 2-bromomethylpropane. What happens when i n-butyl chloride is treated with alcoholic KOH, ii bromobenzene is treated with Mg in the presence of dry ether, iii chlorobenzene is subjected to hydrolysis, iv ethyl chloride is treated with aqueous KOH, v methyl bromide is treated with sodium in the presence of dry ether, vi methyl chloride is treated with KCN. This reaction is a dehydrohalogenation reaction. However, it undergoes hydrolysis when heated in an aqueous sodium hydroxide solution at a temperature of K and a pressure of atm to form phenol. This reaction is known as the Wurtz reaction.

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HALOALKANES AND HALOARENES

Chapter 4 : Haloalkanes and Haloarenes class 12 Notes Chemistry |

NCERT solutions for class 12 chemistry chapter 10 is an interesting chapter and students can easily break it down and learn the different topics to excel in the examination. Class 12 chemistry chapter 10 basically deals with the topic of haloalkanes and haloarenes.

Why is sulphuric acid not used during the reaction of alcohols with KI? As a result, the reaction between alcohol and HI to produce alkyl iodide cannot occur. Therefore, sulphuric acid is not used during the reaction of alcohols with KI. Write structures of different dihalogen derivatives of propane. The structures of these derivatives are shown below. This is because, replacement of any H-atom leads to the formation of the same product. The isomer is neopentane. Therefore, the isomer is 2-methylbutane. Draw the structures of major monohalo products in each of the following reactions: Arrange each set of compounds in order of increasing boiling points. Since the atomic mass of Br is greater than that of Cl, the boiling point of bromomethane is higher than that of chloromethane. Further, for alkyl halides containing the same alkyl group, the boiling point increases with an increase in the number of halides. Therefore, the boiling point of Dibromomethane is higher than that of chloromethane and bromomethane, but lower than that of bromoform. Hence, the given set of compounds can be arranged in the order of their increasing boiling points as: For alkyl halides containing the same halide, the boiling point increases with an increase in the size of the alkyl group. Thus, the boiling point of 1-chlorobutane is higher than that of isopropyl chloride and 1-chloropropane. Further, the boiling point decreases with an increase in branching in the chain. Thus, the boiling point of isopropyl alcohol is lower than that of 1-chloropropane. Hence, the given set of compounds can be arranged in the increasing order of their boiling points as: Which alkyl halide from the following pairs would you expect to react more rapidly by an SN2 mechanism? The approaching of nucleophile is more hindered in 2-bromobutane than in 1-bromobutane. Therefore, 1-bromobutane reacts more rapidly than 2-bromobutane by an SN2 mechanism. Hence, 2-bromobutane reacts more rapidly than 2-bromomethylpropane by an SN2 mechanism. Both the alkyl halides are primary. Therefore, the approaching nucleophile is less hindered in case of the former than in case of the latter. Hence, the former reacts faster than the latter by SN2 mechanism. In the following pairs of halogen compounds, which compound undergoes faster SN1 reaction? Greater the stability of the carbocation, faster is the rate of SN1 reaction. This is known as Wurtz reaction. Name the following halides according to IUPAC system and classify them as alkyl, allyl, benzyl primary, secondary, tertiary, vinyl or aryl halides:

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Chapter 5 : NCERT Textbook Chapter 10 - Haloalkanes and Haloarenes, Chemistry, Class 12 | EduRev N

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Bond strength of haloalkanes decreases as the size of the halogen atom increases. Dipole moment decreases as the electronegativity of the halogen decreases. Haloalkanes though polar but are insoluble in water as they do not form hydrogen bonding with water. Nucleophilic Substitution Reactions SN reactions kCN is predominantly ionic and provides cyanide ions in solution, which is ambident nucleophile and bind with carbon side to form as the major product, while AgCN is covalent and form isocyanide as the major product. Vinyl chloride is less reactive towards nucleophilic substitution reactions due to resonance. Nucleophilic substitution reactions are of two types a SN1 type Unimolecular nucleophilic reactions proceed in two steps: It is a first order reaction. In SN1 reactions, partial racemisation occurs due to the possibility of frontal as well as backside attack on planar carbocation. During SN2 reaction, inversion of configuration occurs Walden inversion i. Strength of some common nucleophiles is: Reaction with Metals Grignard reagent is never isolated in the solid state as it explodes in dry state. So it is used as ethereal solution. By Halogenation of Aromatic Hydrocarbons It is an electrophilic substitution reaction. By Side Chain Halogenation It involves free radical mechanism. From Benzene Diazonium Salt 4. Aryl halides are colourless liquids or colourless solids with characteristic odour. Boiling point generally increases with increase in the size of aryl group or halogen atom. The melting point of p-isomer is more than o- and m-isomer. This is because of more symmetrical nature of p-isomer. Due to resonance in chlorobenzene, C-Cl bond is shorter and hence, its dipole moment is less than that of cyclohexylchloride. Chemical Properties of Aryl Halides 1. Nucleophilic Substitution Reaction Aryl halides are less reactive towards nucleophilic substitution reaction. Their low reactivity is attributed due to the following reasons: Due to resonance, C-X bond has partial double bond character. Stabilisation of the molecule by delocalisation of electrons. Instability of phenyl carbocation. Presence of electron withdrawing group $-\text{NO}_2$ increases the reactivity. Electrophilic Substitution Reactions Halogens are deactivating but O, p-directing.

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HALOALKANES AND HALOARENES

Chapter 6 : Haloalkanes and Haloarenes NCERT Solution Class 12

NCERT Exemplar Problems Class 12 Chemistry Chapter 10 Haloalkanes and Haloarenes Multiple Choice Questions Single Correct Answer Type Question 1. The order of reactivity of following alcohols with halogen acids is Solution: (b) The reactivity order of alcohols towards halogen acids is $3^\circ > 2^\circ > 1^\circ$, since the stability of carbocations is of the [].

Full Screen Page 1 The replacement of hydrogen atoms in a hydrocarbon, aliphatic or aromatic, by halogen atoms results in the formation of alkyl halide haloalkane and aryl halide haloarene, respectively. Haloalkanes contain halogen atoms attached to the sp^3 hybridised carbon atom of an alkyl group whereas haloarenes contain halogen atoms attached to sp^2 hybridised carbon atoms of an aryl group. Many halogen containing organic compounds occur in nature and some of these are clinically useful. These classes of compounds find wide applications in industry as well as in day-to-day life. They are used as solvents for relatively non-polar compounds and as starting materials for the synthesis of wide range of organic compounds. Chlorine containing antibiotic, chloramphenicol, produced by soil microorganisms is very effective for the treatment of typhoid fever. Our body produces iodine containing hormone, thyroxine, the deficiency of which causes a disease called goiter. Synthetic halogen compounds, viz. Certain fully fluorinated compounds are being considered as potential blood substitutes in surgery. In this Unit, you will study the important methods of preparation, physical and chemical properties and uses of organohalogen compounds. These may be classified as mono, di, or polyhalogen tri-,tetra-, etc. For example, Monohalocompounds may further be classified according to the hybridisation of the carbon atom to which the halogen is bonded, as discussed below. This class includes a Alkyl halides or haloalkanes $R-X$ In alkyl halides, the halogen atom is bonded to an alkyl group R. They are further classified as primary, secondary or tertiary according to the nature of carbon to which halogen is attached. Having learnt the classification of halogenated compounds, let us now learn how these are named. The common names of alkyl halides are derived by naming the alkyl group followed by the halide. For dihalogen derivatives, the prefixes o-, m-, p- are used in common system but in IUPAC system, the numerals 1,2; 1,3 and 1,4 are used. The dihalo-compounds having same type of halogen atoms are further classified as geminal halides halogen atoms are present on the same carbon atom and vicinal halides halogen atoms are present on the adjacent carbon atoms. In common name system, gem-dihalides are named as alkylidene halides and vic-dihalides Page 4 The replacement of hydrogen atoms in a hydrocarbon, aliphatic or aromatic, by halogen atoms results in the formation of alkyl halide haloalkane and aryl halide haloarene, respectively. In common name system, gem-dihalides are named as alkylidene halides and vic-dihalides Chemistry are named as alkylene dihalides. Name each isomer according to IUPAC system and classify them as primary, secondary or tertiary bromide. Butylidoheptane iv 1,4-Dibromobutene v 1-Bromosec. Since halogen atoms are more electronegative than carbon, the carbon-halogen bond of alkyl halide is polarised; the carbon atom bears a partial positive charge whereas the halogen atom bears a partial negative charge. Since the size of halogen atom increases as we go down the group in the periodic table, fluorine atom is the smallest and iodine atom, the largest. Consequently the carbon-halogen bond length also increases from $C-F$ to $C-I$. Some typical bond lengths, bond enthalpies and dipole moments are given in Table

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Chapter 7 : NCERT Solutions for Class 12 Science Chemistry Chapter 1 - Haloalkanes And Haloarenes

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Thus, C atom of chlorobenzene has less tendency to release electrons to Cl than carbon atom of cyclohexylchloride. As a result, C-Cl bond in chlorobenzene is less polar than in cyclohexylchloride. Further, due to delocalization of lone pairs of electrons of the Cl atom over the benzene ring, C-Cl bond in chlorobenzene acquires some double bond character while the C-Cl in cyclohexyl! In other words, C-Cl bond in chlorobenzene is shorter than in cyclohexyl chloride. Since dipole moment is a product of charge and distance, therefore, chlorobenzene has lower dipole moment than cyclohexylchloride due to lower magnitude of negative charge on the Cl atom and shorter C-Cl distance. The molecules of H₂O are hold together by H-bonds. Since the new forces of attraction between water and alkyl halide molecules are weaker than the forces of attraction already existing between alkyl halide and alkyl halide molecules and water-water molecules, therefore, alkyl halides are immiscible not soluble in water. Alkyl halide are neither able to form H-bonds with water nor are able to break the H-bonding network of water. They react with moisture present in the apparatus to form alkanes Thus, Grignard reagents must be prepared under anhydrous conditions. It was earlier used as an antiseptic but the antiseptic properties are due to the liberation of free iodine and not due to iodoform itself. Due to its objectionable smell, it has been replaced by other formulations containing iodine. Freon CCl₂F₂ is most common freons in industrial use. For aerosol propellants, refrigeration and air conditioning purposes. Many species of insects developed resistance to DDT, it was also discovered to have a high toxicity towards fishes. DDT is not metabolised very rapidly by animals, instead it is deposited and stored in the fatty tissues. If the ingestion continues at a steady rate, DDT builds up within the animals overtime. KCN is a resonance hybrid of the following two contributing structures: Since C-C bond is stronger than C-N bond, therefore, attack occurs through C to form n-butyl cyanide. The S_N2 reactions reactivity depends upon steric hindrance. More the steric hindrance slower the reaction. Thus, the reactivity of the given alkyl bromides decreases in the order: In S_N1 reactions, the reactivity depends upon the stability of carbocations. The p-isomer being more symmetrical fits closely in the crystal lattice and thus has stronger inter-molecular forces of attraction than o- and m-isomers. Since during melting or dissolution, the crystal lattice breaks, therefore, a large amount of energy is needed to melt or dissolve the p-isomer than the corresponding o-and m-isomers. In other words, the melting point of the p-isomer is higher and its solubility lower than the corresponding o-and m-isomers. In aqueous solution, KOH is almost completely ionized to give OH⁻ ions which being a strong nucleophile brings about a substitution reaction on alkyl halides to form alcohols. Further in the aqueous solution, OH⁻ ions are highly solvated hydrated. This solvation reduces the basic character of OH⁻ ions which, therefore, fails to abstract a hydrogen from the P-carbon of the alkyl chloride to form alkenes. In contrast, an alcoholic solution of KOH contains alkoxide RO⁻ ion which being a much stronger base than OH⁻ ions preferentially eliminates a molecule of HCl from an alkyl chloride to form alkenes. When a is reacted with sodium metal it give 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. Therefore, compound c is tert-butyl bromide which is an isomer of compound a.

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Chapter 9 : NCERT Solutions For Class 12 Chemistry Chapter 10 Haloalkanes and Haloarenes

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