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Where Minds Pollinate

Class 11
Chemistry

Chapter 17
Halogenoalkanes
Handwritten Notes

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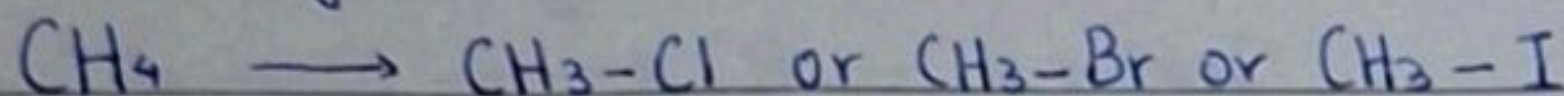


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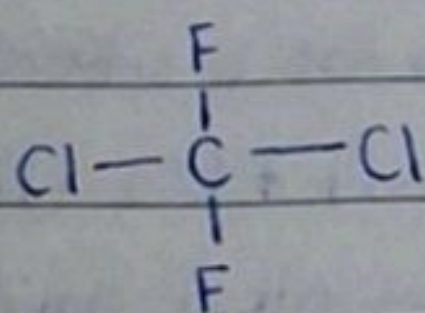
Ch 17 : Halogenoalkanes

Halogenoalkane

Halogenoalkanes are compounds in which one or more hydrogen atoms in an alkane have been replaced by a halogen atoms (fluorine, chlorine, bromine, iodine). They are also known as haloalkanes or alkyl halides.



Alkyl halides are the compounds which have the general formula "RX" where R is an alkyl or substituted alkyl group and X is a halogen. Compounds containing more than one kind of halogen are also possible. For example, Chlorofluorocarbons.



Types of Halogenoalkanes

They can be classified based on the no. of halogen atoms attached to the carbon chain.

- Monohalokanes

These compounds have one halogen atom attached with carbon chain. Ex. Chloromethane (CH_3Cl)

- Dihaloalkanes

These compounds have two halogen atoms attached to the carbon chain. Ex. 1,2Dichloroethane

- Trihaloalkanes

These compounds have three halogen atoms attached to carbon chain. Ex. Chloroform.

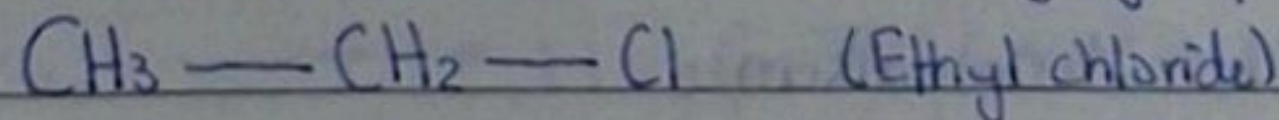
Classification of Halogenoalkanes

They can be classified based on the carbon atom to which the halogen is attached.

- Primary alkyl halides

Alkyl halide in which halogen atom is attached with primary carbon are called primary alkyl halides.

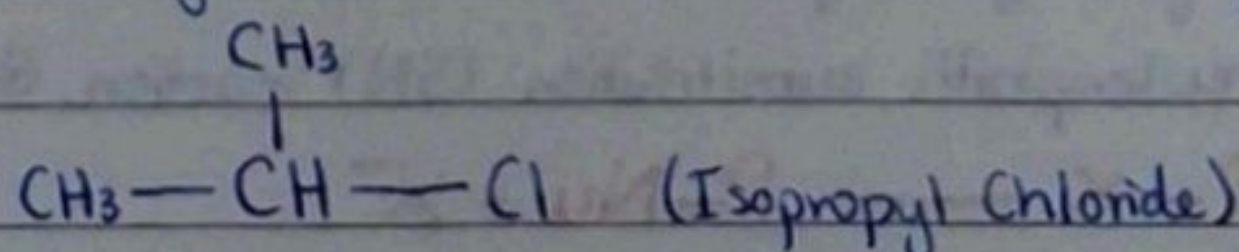
Primary carbon is the carbon to which one or no alkyl group is attached. RCH_2X



- Secondary alkyl halides

Alkyl halide in which halogen atom is attached with a secondary carbon atom is called

secondary alkyl halide. Secondary carbon is carbon to which two alkyl groups are attached. R_2CHX

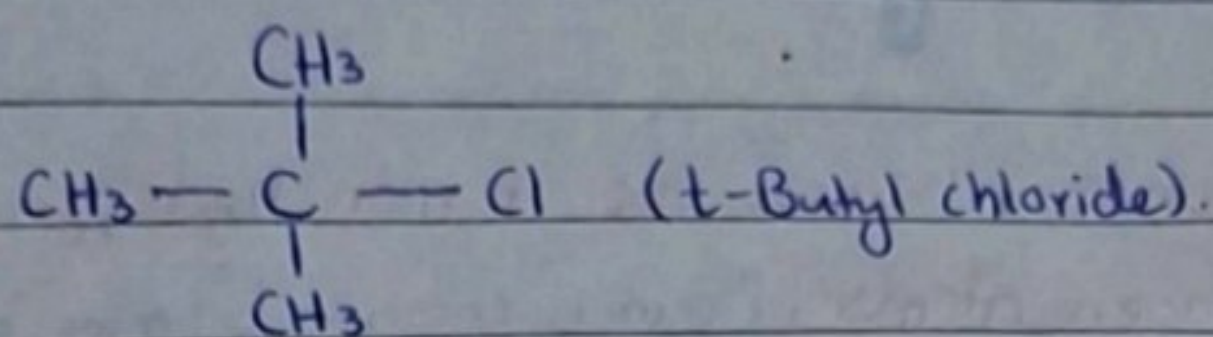


- Tertiary alkyl halides

Alkyl halide in which halogen atom is attached to a tertiary carbon is called tertiary alkyl

halide. Tertiary carbon is carbon to which three alkyl groups are attached. R_3CCl

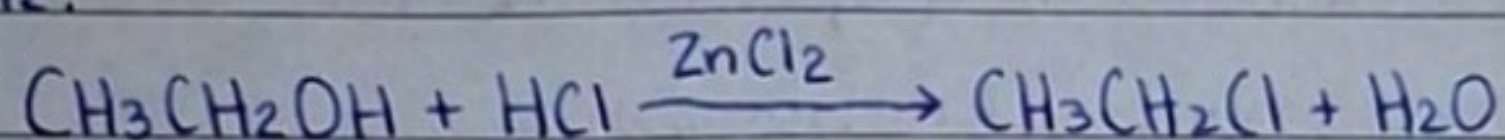
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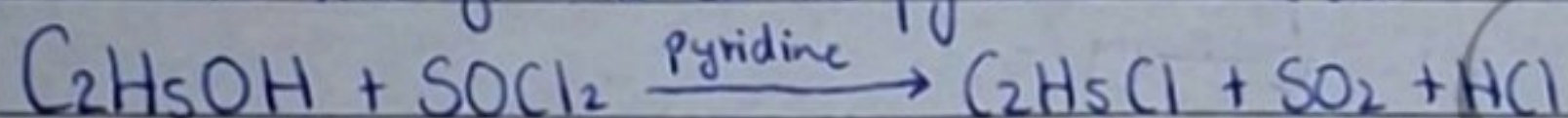
Preparation of Alkyl Halides

- From Alcohol

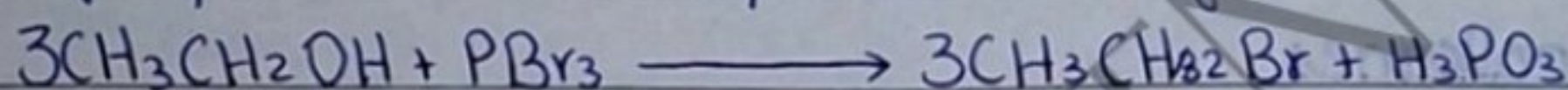
Alcohol may be converted to corresponding alkyl halide, when treated with HCl in the presence of ZnCl_2 .



Alcohol also reacts with thionyl chloride in pyridine as a solvent to give alkyl chloride.

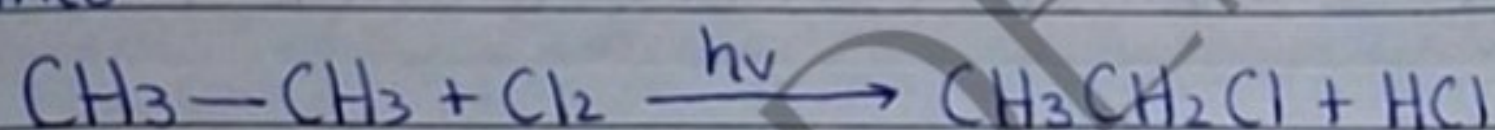


Alcohol reacts with phosphorus trihalide to produce an alkyl halide.



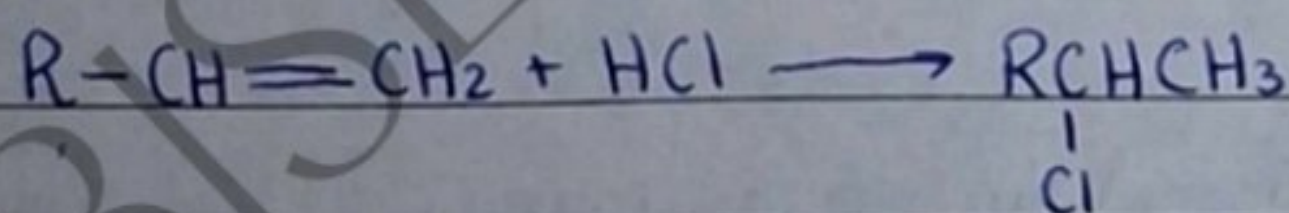
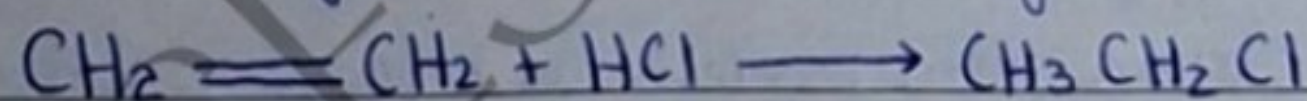
- From Alkanes

When alkanes are treated with chlorine or bromine in the presence of sunlight then alkyl halide is formed.



- From Alkenes

Alkenes react with aqueous solution of halogen acid (HX) at room temperature to form alkyl halides. The reaction involves breaking of carb-carbon double bond, followed by electrophilic addition of H-atom and halogen. Addition follows Markonikov's rule.



Alkenes react with halogen in an inert solvent like carbon tetrachloride at room temperature to give vicinal dihalides or 1,2 dihaloalkanes.

Reactions of Alkyl Halide

- Nucleophilic Substitution Reaction

Those reaction where halogen of alkyl halide is substituted or replaced by attacking nucleophile is known as nucleophilic substitution (S_N) reaction. General reaction is given as:

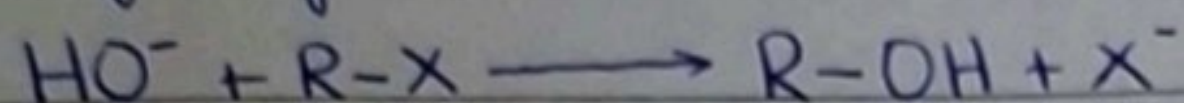


Attacking
nucleophile

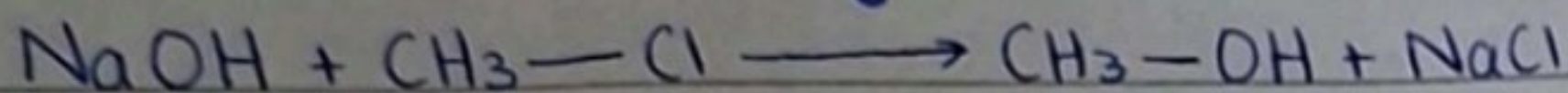
Substrate

Leaving group

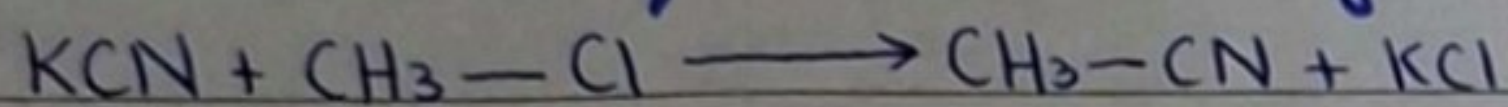
Nucleophile is species having lone pair of electrons and donate a pair of electron to electrophilic carbon of alkyl halide.



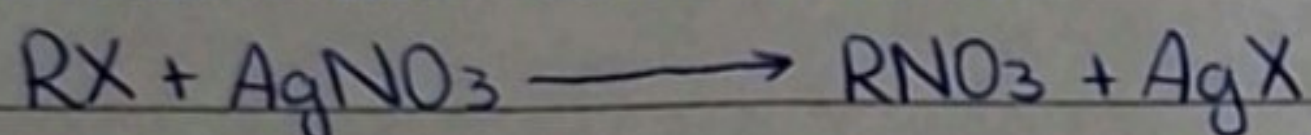
• Reaction with Sodium Hydroxide



• Reaction with Aqueous Potassium Cyanide



• Reaction with Silver Nitrate



• Chlorides form white ppt which remain un-dissolved on adding aqueous ammonia.

• Bromide forms cream ppt, which partially dissolves in aqueous ammonia.

• Iodide forms yellow ppt, which remains un-dissolved in aqueous ammonia.

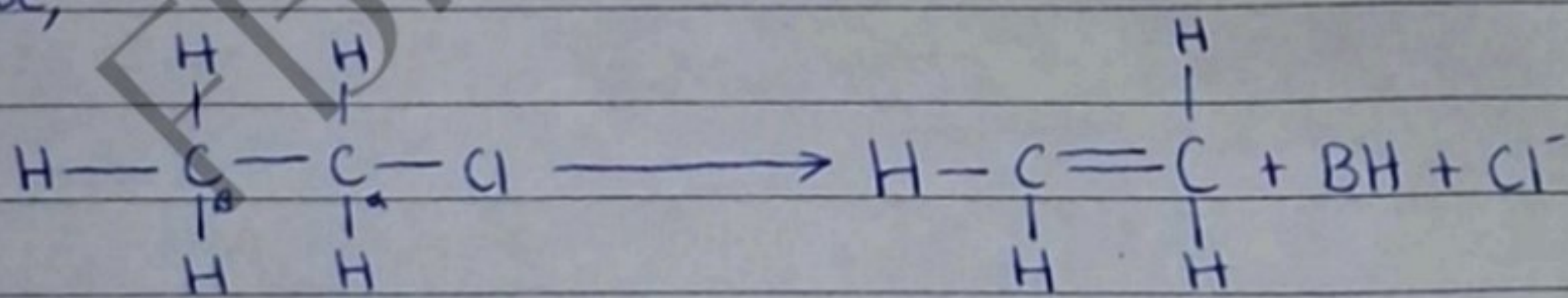
- Elimination Reactions

They are organic reactions in which a pair of atoms or groups of atoms are removed from a molecule. It happens usually through the action of acids, bases and in some cases by heating to high temperature. It is the process by which organic compounds containing only single carb-carbon bond are transformed to compounds containing double or triple carbon-carbon bonds.

• 1,2 Elimination reaction

The chemical reaction in which two atoms (halogen and β hydrogen from alkyl halide) are eliminated from two adjacent carbon atoms to form carbon-carbon double bond is called elimination reaction. Also known as β -Elimination reaction. Because hydrogen is removed from β -carbon.

Base,



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