3055 BA SANGAM COLLEGE

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WORKSHEET 14

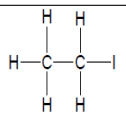
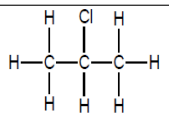
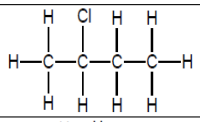
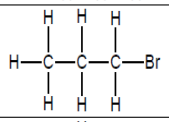
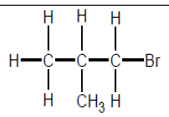
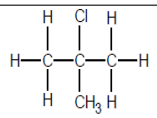
School: Ba Sangam College **Year:** 13
Subject: Chemistry **Name:**

Strand	**4 - Materials**
Sub strand	**4.2- Organic Chemistry**
Content Learning Outcome	**-State the general formula of alkyl halides.** **-Identify and name some alkyl halides using IUPACnomenclature.** **-Describe the physical properties of alkyl halides.**

Alkyl halides(haloalkanes/ halogenoalkanes)

- Alkyls are alkanes with one or more of their hydrogen atoms replaced by halogen atoms.
- general formula: **CnH2n+1X**; where X= F, Cl, Bror I.

Examples of some Alkyl halide

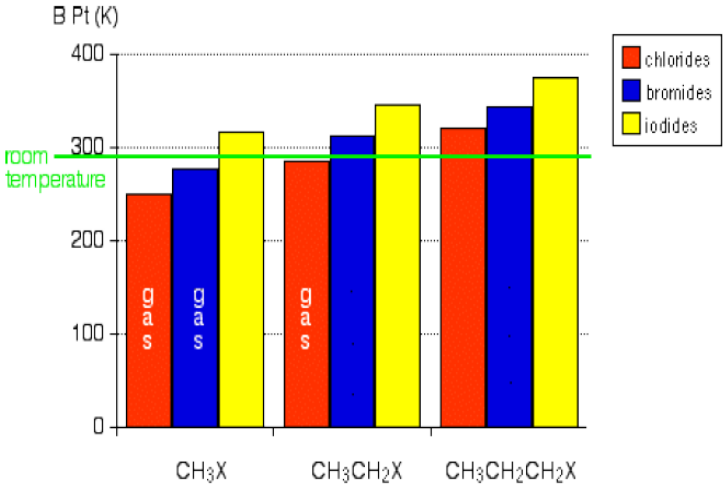
Condensed Structural Formula	Expanded Structural Formula	Name
CH_3CH_2I		Iodoethane
$CH_3CHClCH_3$		2-chloropropane
$CH_3CHClCH_2CH_3$		2-chlorobutane
$CH_3CH_2CH_2Br$		1-bromopropane
$CH_3CHCH_3CH_2Br$		1-bromo-2-methylpropane
$CH_3CClCH_3CH_3$		2-chloro-2-methylpropane

Physical Properties of Alkyl halides

1. **Boiling Point**

- Van der Waals dispersion forces of attractions get strongeras the molecules get longer and have more electrons. This increases thesize of the temporary dipoles that are set up. This is why the boiling point of the **alkyl halides increases as the number of carbon atoms in the chainsincreases.**

Example:



- For a particular type of halide (example, a chloride), dispersion forces getstronger and the molecular mass increases as you go from 1 to 2 to 3carbons in the chain. It takes more energy to overcome them, and so theboiling points rise.
- The increase in boiling point as you go from a chloride to a bromide to aniodide (for a given number of carbon atoms) is also because of the increasein number of electrons leading to larger dispersion forces. For example,there are more electrons in iodomethane (CH3I) than there are inchloromethane (CH3Cl).
- Also, the carbon-halogen bonds are mostly polar since the electron pair ispulled closer to the halogen atom than the carbon atom.

- This means that in addition to the dispersion forces there will be forcesdue to the attractions between the permanent dipoles.

2. Solubility of Alkyl halides

a. Solubility in water

- Alkyl halides are only very slightly soluble in water.In order for an alkyl halide to dissolve in water, the intermolecularattractions between the alkyl halidemolecules and the hydrogen bondsbetween water molecules need to be broken. Breaking both such bonds require lots of energy.
- The energy released when new intermolecular attractions are formedbetween the alkyl halide and the water molecules are much less thanthe energy used to separate the water molecules. This is because thenew intermolecular attractions formed between the alkyl halidemolecules and the water molecules are not as strong as the originalhydrogen bonds in water. For this reason, the alkyl halides are lesssoluble in water.

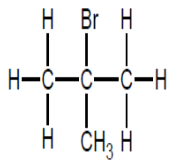
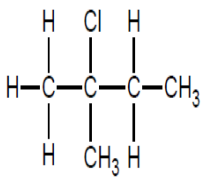
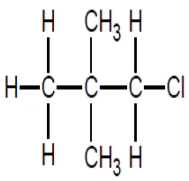
b. Solubility in organic solvents

- Alkyl halides dissolve well in organic solvents because the newintermolecular attractions being formed have the same strength as theones being broken in the separate alkyl halide and the organic solvent.
- This means that enough energy is available to overcome theintermolecular attractions in the alkyl halides and organic solvents andform new intermolecular attractions.

Exercise

1. Name the following alkyl halides.

(3 marks)

2. Explain why the C-F bond is the strongest and the C-I bond is theweakest. Comment on the reactivity of the alkyl halides of thecompounds of iodine and fluorine.

(2 marks)

_____
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3. Comment on the solubility of alkyl halides in water and organicsolvents.**(2 marks)**

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4. What is the IUPAC name for

a. $CH_3CHClCH(CH_3)CH_2CH_2Br$

_____

(1 mark)

b. $ClCH_2CH_2Cl$

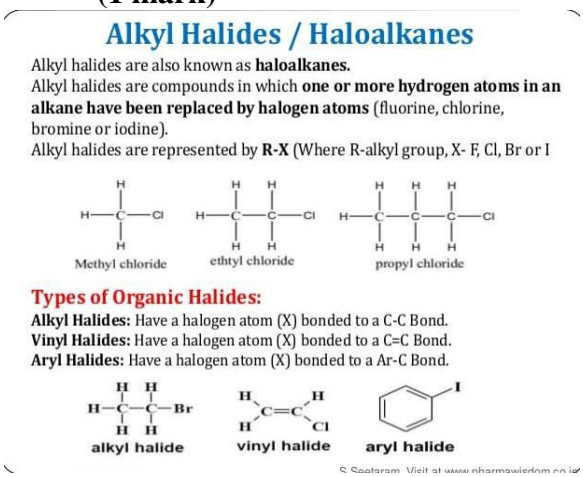
_____

(1 mark)

c. $CH_3CH_2CH_2Br$

_____

(1 mark)



Alkyl Halides / Haloalkanes

Alkyl halides are also known as **haloalkanes.**
Alkyl halides are compounds in which **one or more hydrogen atoms in an alkane have been replaced by halogen atoms** (fluorine, chlorine, bromine or iodine).
Alkyl halides are represented by **R-X** (Where R-alkyl group, X- F, Cl, Br or I

Methyl chloride | ethtyl chloride | propyl chloride

Types of Organic Halides:

Alkyl Halides: Have a halogen atom (X) bonded to a C-C Bond.
Vinyl Halides: Have a halogen atom (X) bonded to a C=C Bond.
Aryl Halides: Have a halogen atom (X) bonded to a Ar-C Bond.

alkyl halide | vinyl halide | aryl halide