

BSc. II 3rd Semester

ALKYL HALIDES

Submitted By

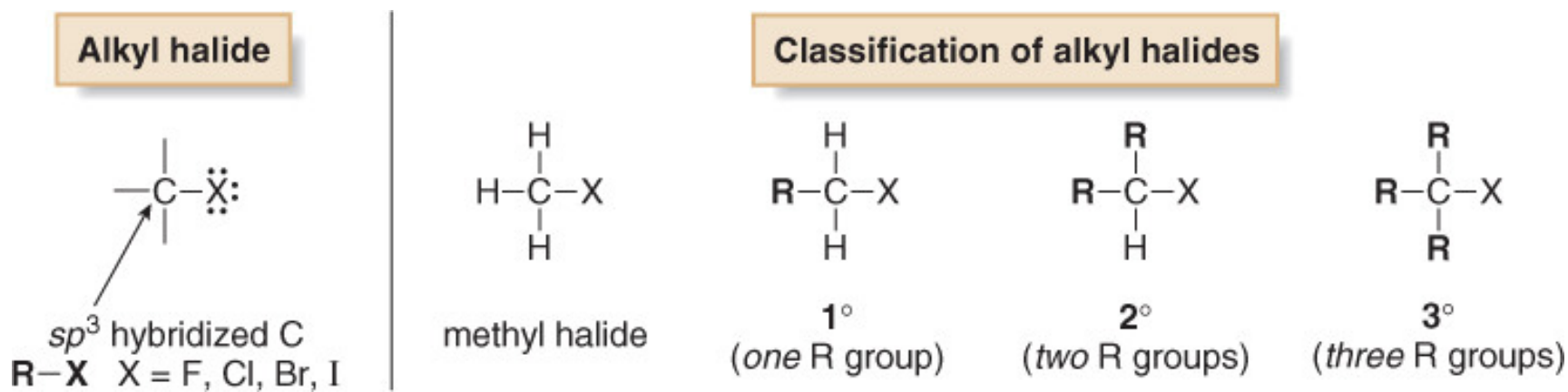
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Introduction to Alkyl Halides

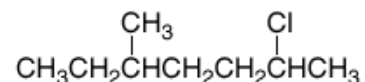
- **Alkyl halides** are organic molecules containing a halogen atom bonded to an sp^3 hybridized carbon atom.
- Alkyl halides are classified as **primary** (1°), **secondary** (2°), or **tertiary** (3°), depending on the number of carbons bonded to the carbon with the halogen atom.
- The halogen atom in halides is often denoted by the symbol “X”.



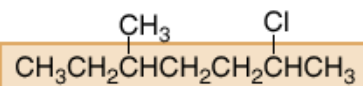
Nomenclature

Name an Alkyl Halide Using the IUPAC System

Example Give the IUPAC name of the following alkyl halide:



Step [1] Find the parent carbon chain containing the halogen.



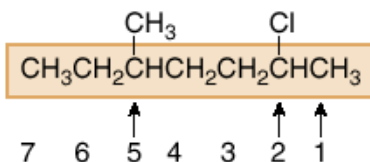
7 C's in the longest chain

7 C's ----> heptane

- Name the parent chain as an **alkane**, with the halogen as a substituent bonded to the longest chain.

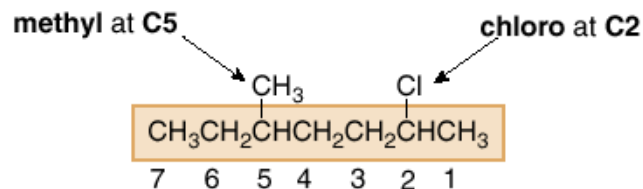
Step [2] Apply all other rules of nomenclature.

a. **Number** the chain.



- Begin at the end nearest the first substituent, either alkyl or halogen.

b. **Name and number** the substituents.

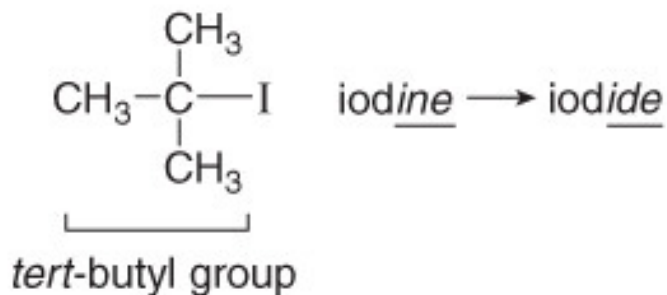


c. **Alphabetize**: c for chloro, then m for methyl.

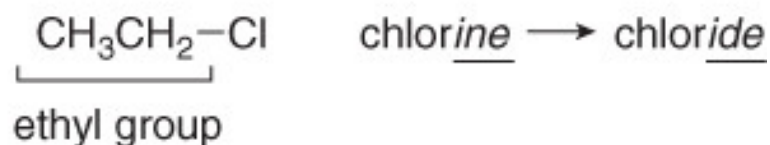
ANSWER: 2-chloro-5-methylheptane

- Common names are often used for simple alkyl halides. To assign a common name:
 - Name all the carbon atoms of the molecule as a single alkyl group.
 - Name the halogen bonded to the alkyl group.
 - Combine the names of the alkyl group and halide, separating the words with a space.

Common names



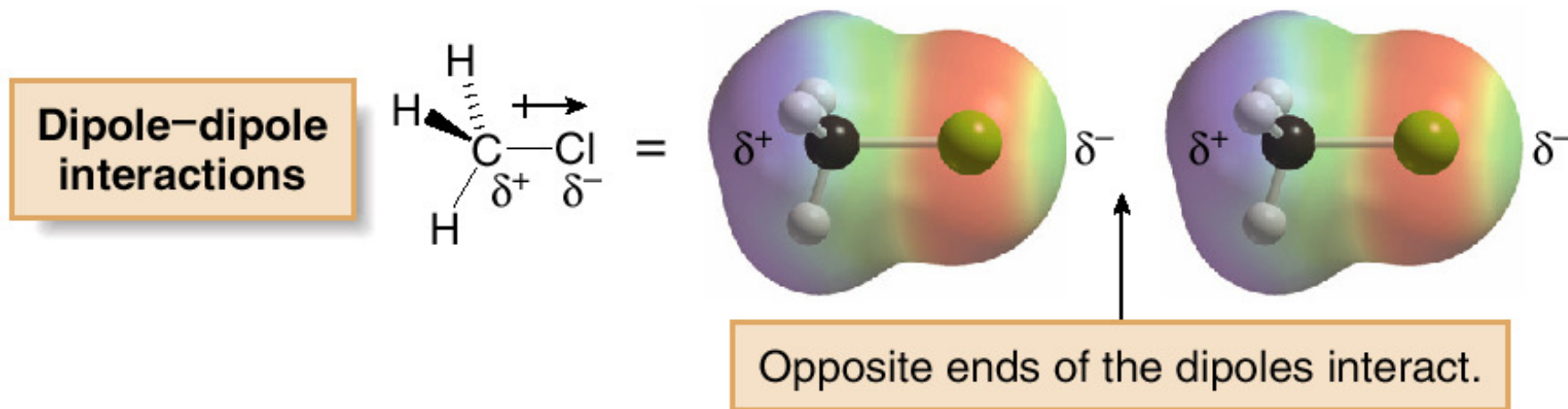
tert-butyl iodide



ethyl chloride

Physical Properties

- Alkyl halides are weak polar molecules. They exhibit dipole-dipole interactions because of their polar C—X bond, but because the rest of the molecule contains only C—C and C—H bonds, they are incapable of intermolecular hydrogen bonding.



Physical Properties of Alkyl Halides

| Property | Observation |
|---------------------------------|---|
| Boiling point and melting point | <ul style="list-style-type: none"> Alkyl halides have higher bp's and mp's than alkanes having the same number of carbons. <div style="text-align: center; margin: 10px 0;"> CH_3CH_3 and $\text{CH}_3\text{CH}_2\text{Br}$ bp = -89°C bp = 39°C </div> Bp's and mp's increase as the size of R increases. <div style="text-align: center; margin: 10px 0;"> $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ </div> <div style="display: flex; justify-content: center; align-items: center; margin: 5px 0;"> <div style="text-align: center; margin-right: 20px;"> mp = -136°C bp = 12°C </div> <div style="text-align: center; margin-right: 20px;"> mp = -123°C bp = 47°C </div> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"> larger surface area— higher mp and bp </div> </div> Bp's and mp's increase as the size of X increases. <div style="text-align: center; margin: 10px 0;"> $\text{CH}_3\text{CH}_2\text{Cl}$ and $\text{CH}_3\text{CH}_2\text{Br}$ </div> <div style="display: flex; justify-content: center; align-items: center; margin: 5px 0;"> <div style="text-align: center; margin-right: 20px;"> mp = -136°C bp = 12°C </div> <div style="text-align: center; margin-right: 20px;"> mp = -119°C bp = 39°C </div> <div style="border: 1px solid black; padding: 5px; background-color: #fff9c4;"> more polarizable halogen— higher mp and bp </div> </div> |
| Solubility | <ul style="list-style-type: none"> RX is soluble in organic solvents. RX is insoluble in water. |