

# Organic Chemistry

## Chem 112

### Lecture 2

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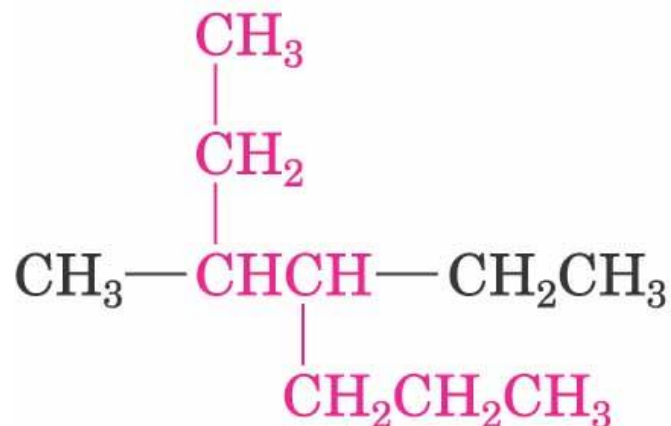
# Alkanes nomenclature- worked exercises

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Find the parent hydrocarbon.



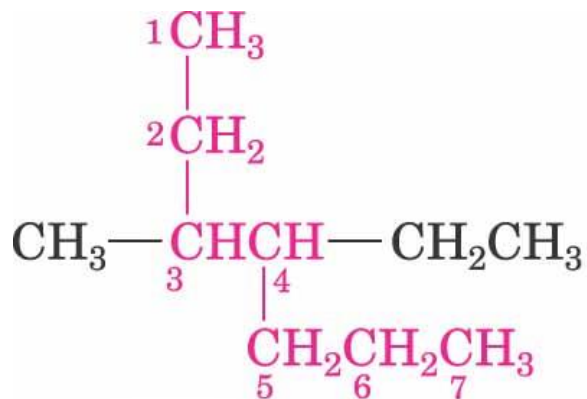
Named as a substituted **hexane**



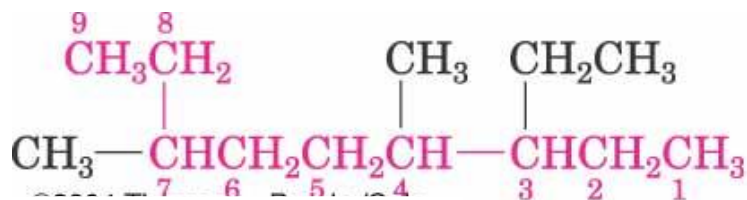
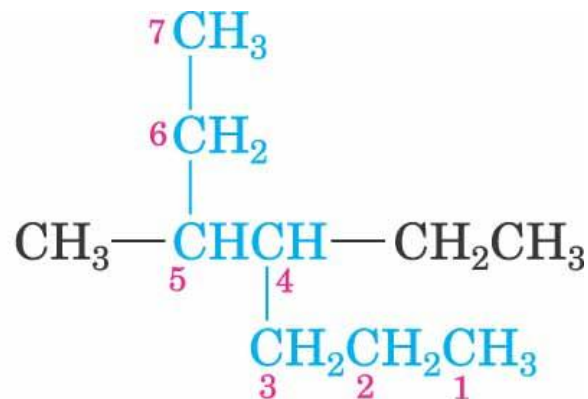
Named as a substituted **heptane**

# Alkanes nomenclature- worked exercises

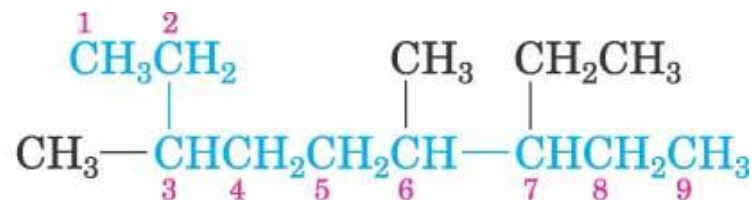
## Number the atoms in the chain



NOT

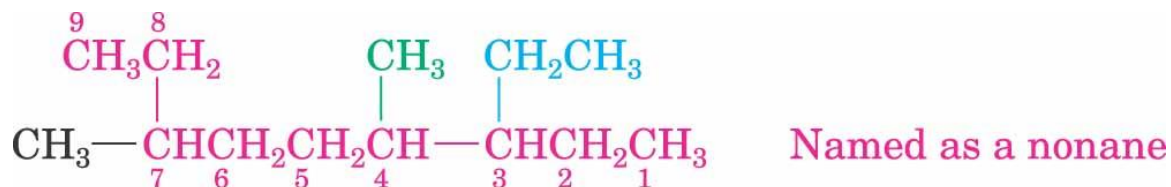


NOT

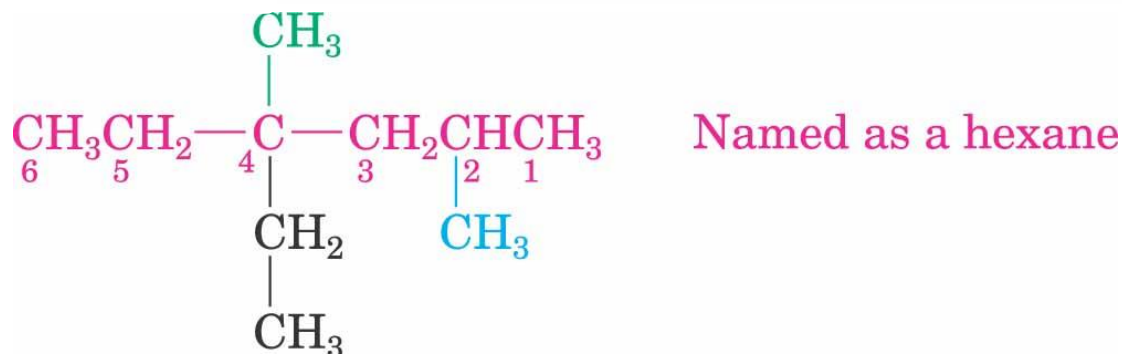


# Alkanes nomenclature- worked exercises

## Identify & number the substituents



Substituents:    On C3, CH<sub>2</sub>CH<sub>3</sub>    (3-ethyl)  
                         On C4, CH<sub>3</sub>            (4-methyl)  
                         On C7, CH<sub>3</sub>            (7-methyl)

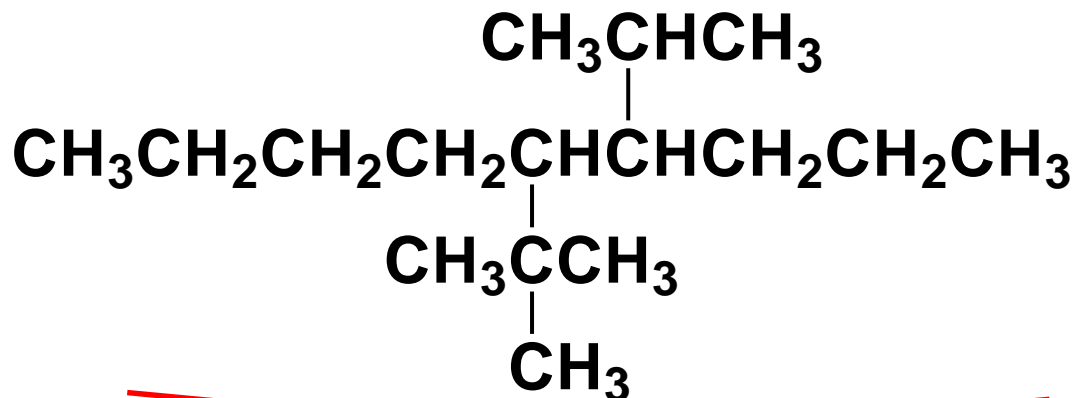


Substituents:    On C2, CH<sub>3</sub>            (2-methyl)  
                         On C4, CH<sub>3</sub>            (4-methyl)  
                         On C4, CH<sub>2</sub>CH<sub>3</sub>    (4-ethyl)



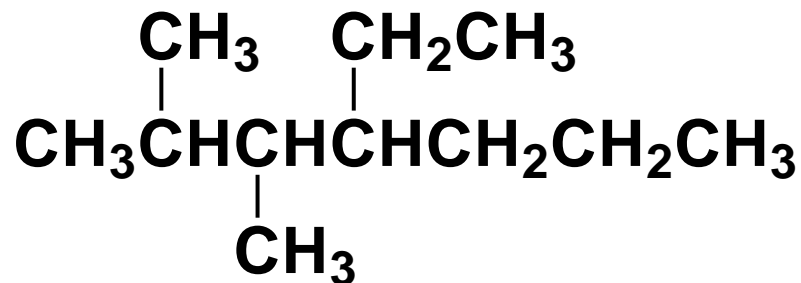
# Alkanes nomenclature- worked exercises

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~~4-isopropyl-5-tert-butylnonane~~

5-tert-butyl-4-isopropylnonane



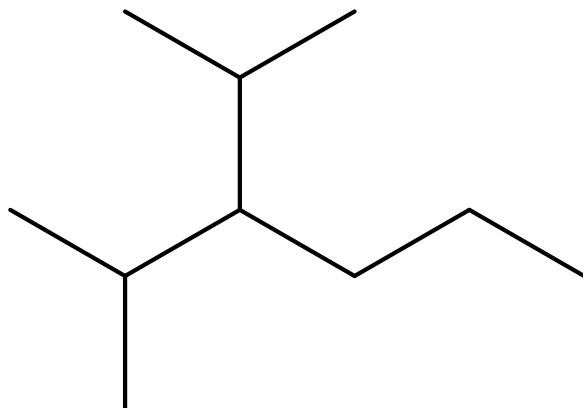
~~2,3-dimethyl-4-ethylheptane~~

4-ethyl-2,3-dimethylheptane

# Alkanes nomenclature- worked exercises

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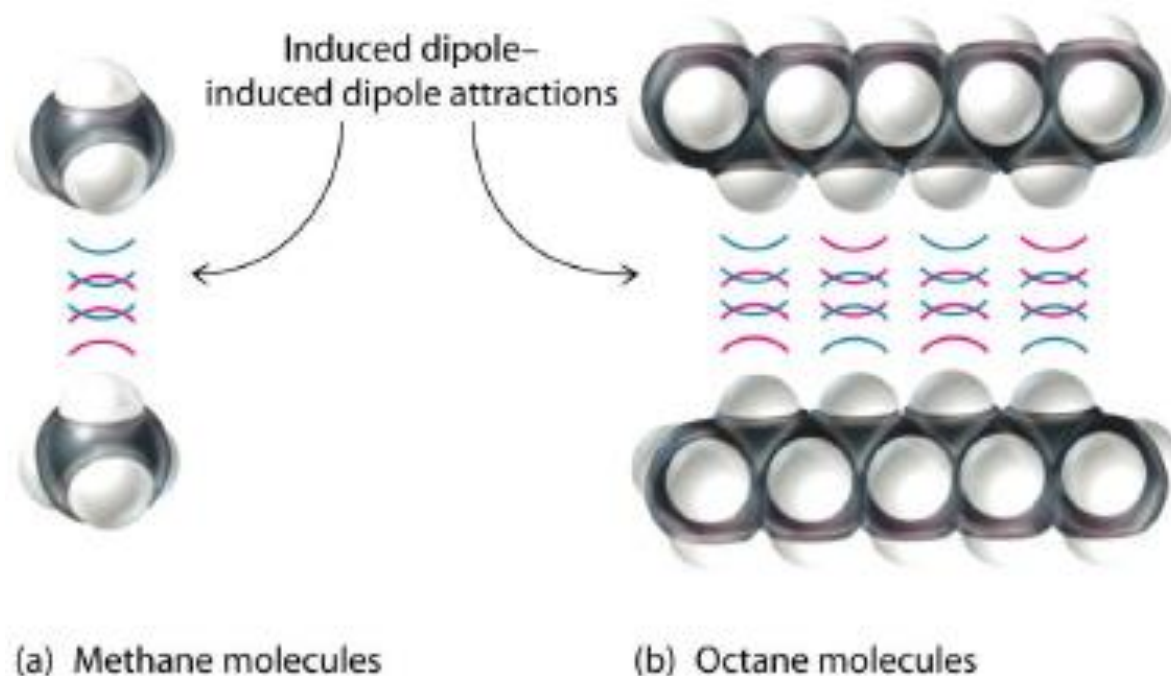
Draw the structure of 3-isopropyl-2-methylhexane



# Physical Properties of Alkanes

- Forces between molecules (temporary dipoles, dispersion) are weak.
- Alkanes have low bp's and mp's compared to more polar compounds of comparable size.
- Bp and mp increases as the number of carbons increases because of increased surface area.

	<u>b.p.</u>
$\text{CH}_4$	$-160^\circ\text{C}$
$\text{C}_2\text{H}_6$	$-89$
$\text{C}_3\text{H}_8$	$-42$
$n\text{-C}_4\text{H}_{10}$	$-0.4$
$n\text{-C}_5\text{H}_{12}$	$36$

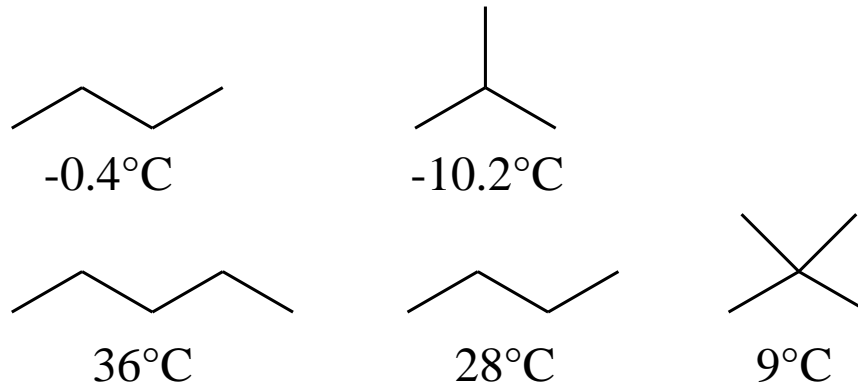




# Physical Properties of Alkanes

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- ❖ Bp decreases with increased branching because of decreased surface area.



## ❖ Solubility of alkanes

- Alkanes are nonpolar and are hydrophobic “water hating” because they do not dissolve in water.

## ❖ Densities of Alkanes

- Alkanes have densities around 0.7 g/mL.
- Therefore a mixture of an alkane (such as gasoline or oil) and water quickly separates into two phases, with the alkane on top.

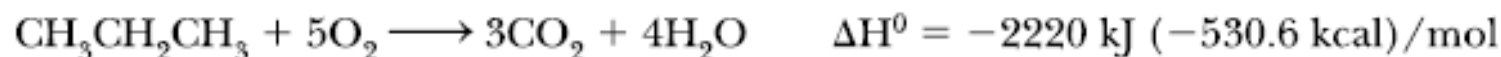
# Reactions of Alkanes

## 1. Combustion

- ❖ Alkanes are important constituents of fuel – that is they burn in the presence of Oxygen, producing carbon dioxide, water, and heat.

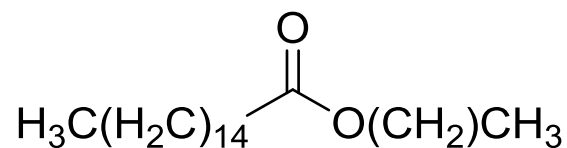


**Methane**

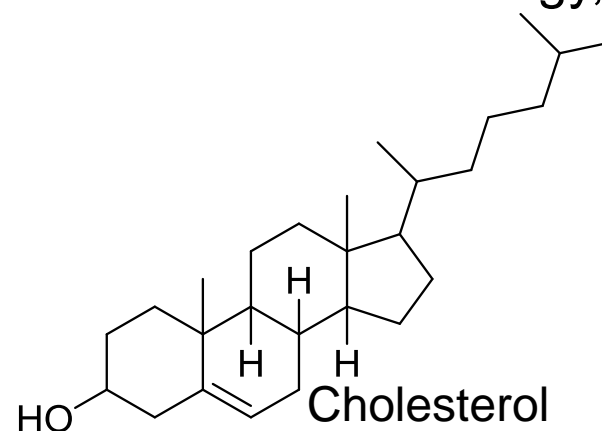


**Propane**

- ❖ Lipids have high energy content. Because they are composed mainly of C–C and C–H bonds, they are oxidized with the release of energy, just like alkanes.



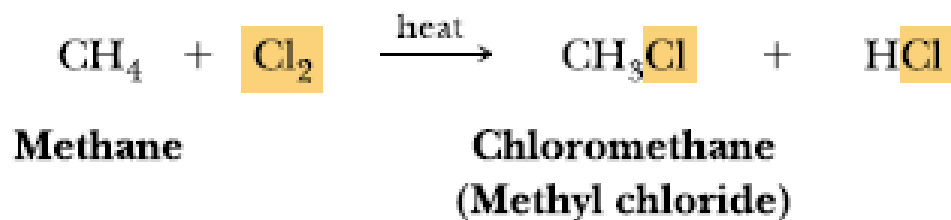
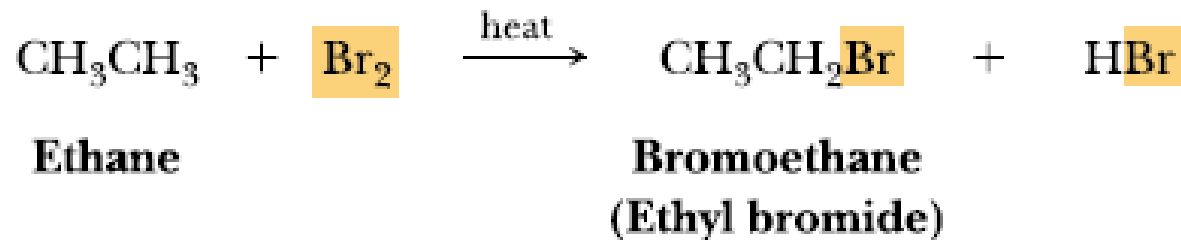
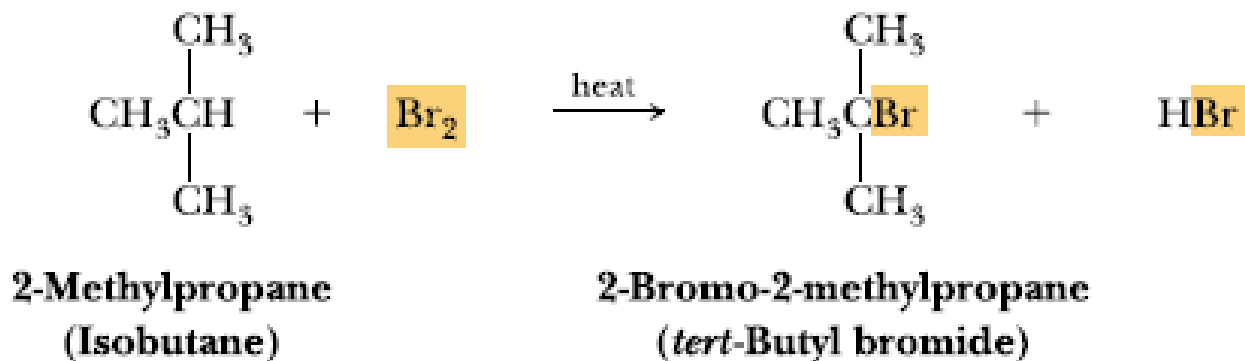
A component of beeswax





# Reactions of Alkanes

## Halogenation of Alkanes



# Reactions of Alkanes

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## Halogenation of Alkanes



**Chloromethane**  
(Methyl chloride)

**Dichloromethane**  
(Methylene chloride)



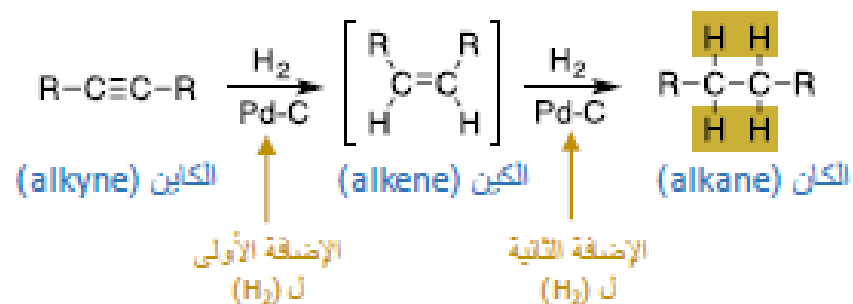
**Dichloromethane**  
(Methylene chloride)

**Trichloromethane**  
(Chloroform)

**Tetrachloromethane**  
(Carbon tetrachloride)

# Synthesis of Alkanes

## 1. Hydrogenation of Unsaturated Hydrocarbons



## 2. Reduction of alkyl halides



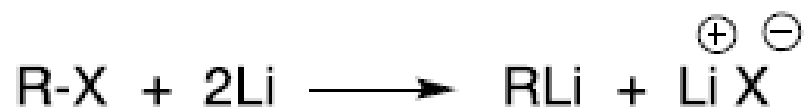
# Reactions of Alkanes

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## 3. Wurtz reaction



## 4. Corey–House synthesis



**Thanks**

**Time for questions**

**????????????????**