

# **Organic Chemistry**

**A brief introduction**

# Organic Chemistry

**the study of carbon-containing compounds  
and their properties**

**excluding: CO, CO<sub>2</sub>, CS<sub>2</sub>, carbonates  
and cyanides**

*eight million known organic compounds*

# Hydrocarbons

**compounds composed of hydrogen and carbon**

## **Aromatic hydrocarbons**

**contain one or more benzene rings ( $C_6H_6$ )**

## **Aliphatic hydrocarbons**

**have no benzene rings**

# **Alkanes**

**The simplest hydrocarbon**

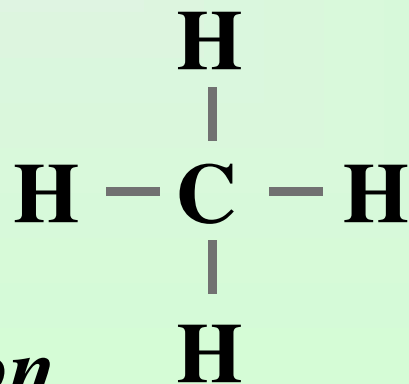
# Alkanes

a hydrocarbon containing only single covalent bonds

generic chemical formula



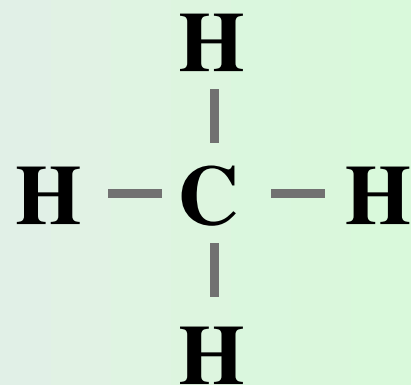
Methane



*sp<sup>3</sup> hybridization*

# Alkanes

**Methane**

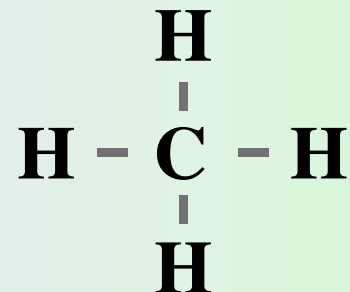


these molecules are said to be **saturated**

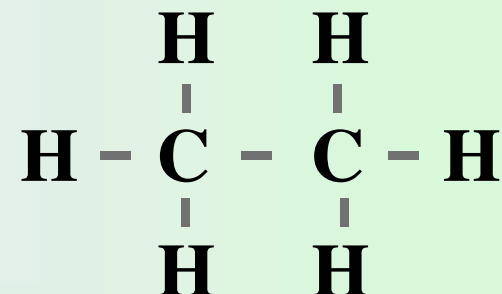
**Saturated:** no more hydrogen atoms  
can be added to the molecule

# Alkanes

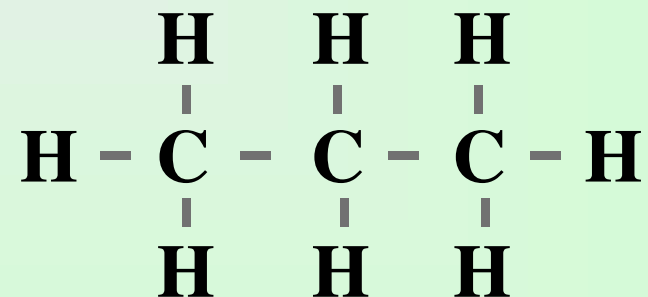
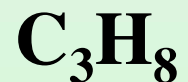
**Methane**



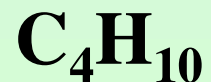
**Ethane**



**Propane**



**Butane**



**Two possible schemes**



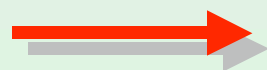
# Levels of Structure

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**Elemental Composition** ✓

**Empirical Formula** ✓

**Molecular Formula** ✓

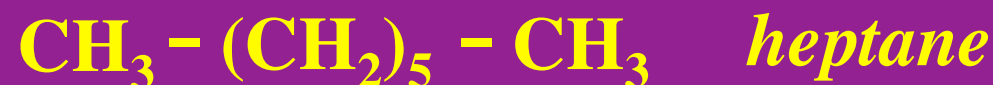
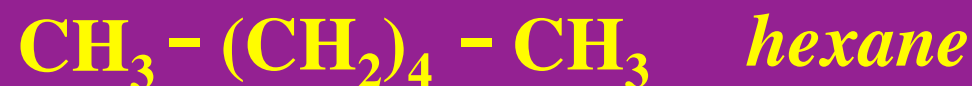


**Constitution**

**the order in which the atoms are  
connected**

# Alkane Nomenclature

the names of alkanes beyond butane are obtained by adding the suffix *-ane* to the Greek root for the number of carbon atoms



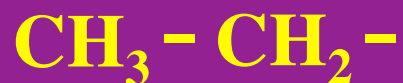
the longest continuous chain of carbon atoms determines the root name

# Alkane Nomenclature

When alkane groups appear as substituents, they are named by dropping the *-ane* and adding *-yl*.



Methyl



Ethyl



Propyl



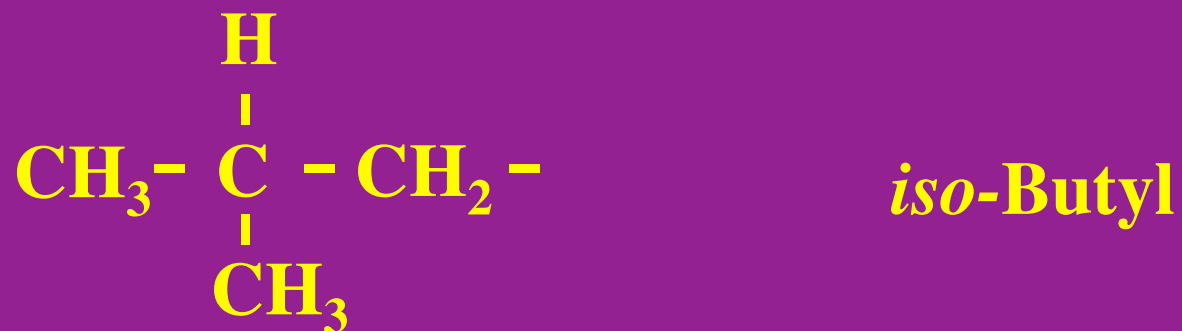
Isopropyl



Butyl

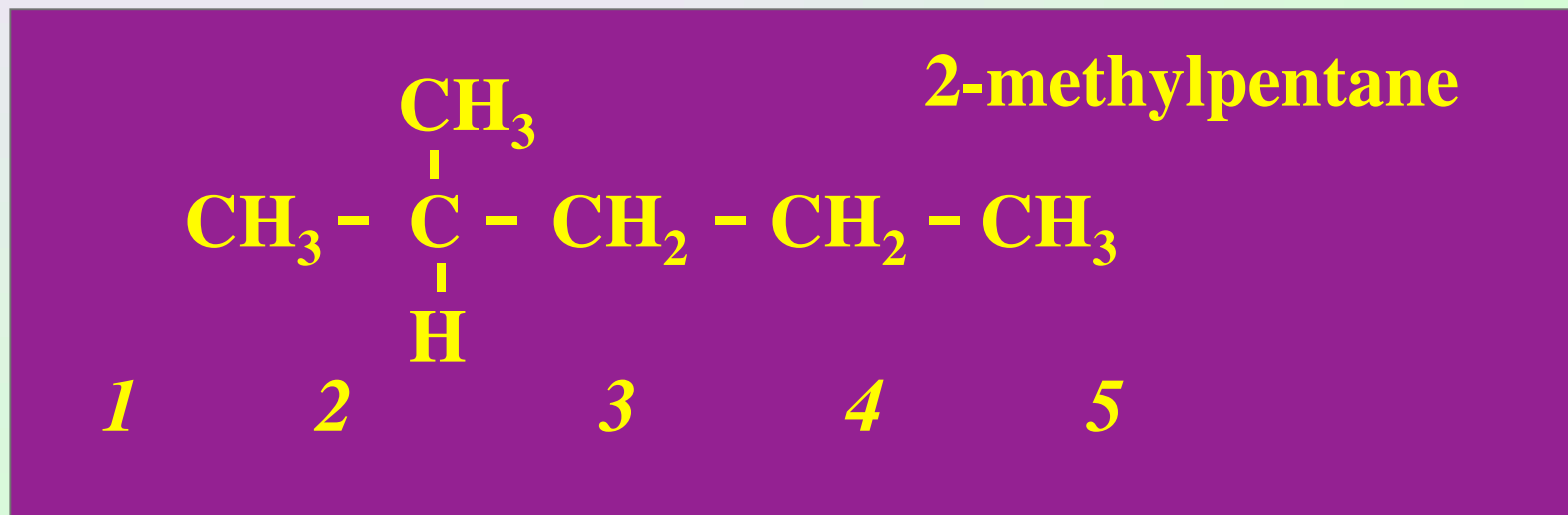
# Alkane Nomenclature

When alkane groups appear as substituents, they are named by dropping the *-ane* and adding *-yl*.



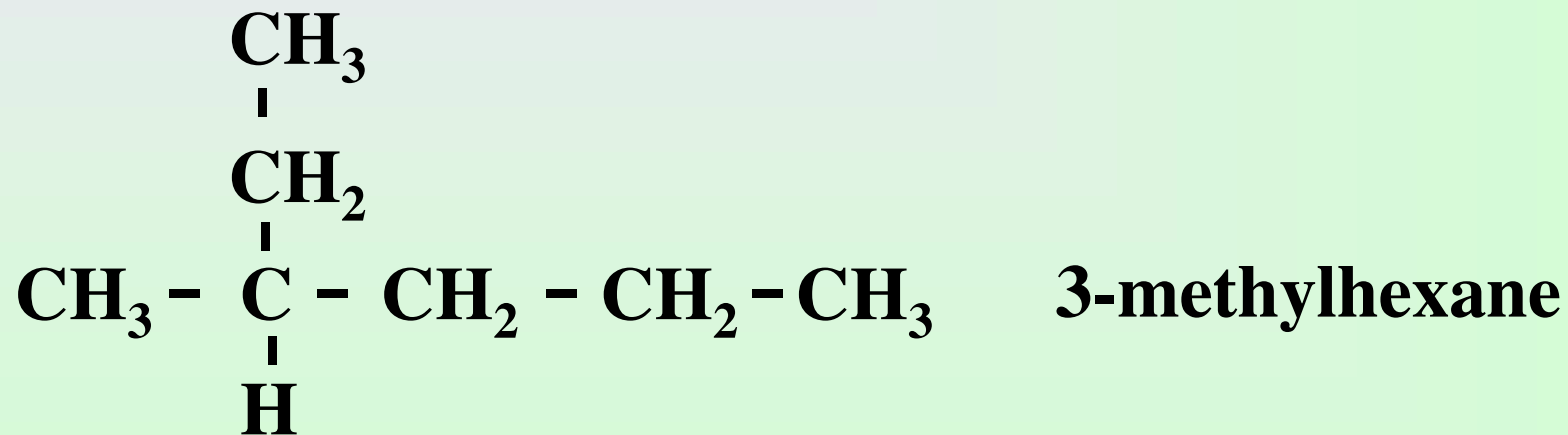
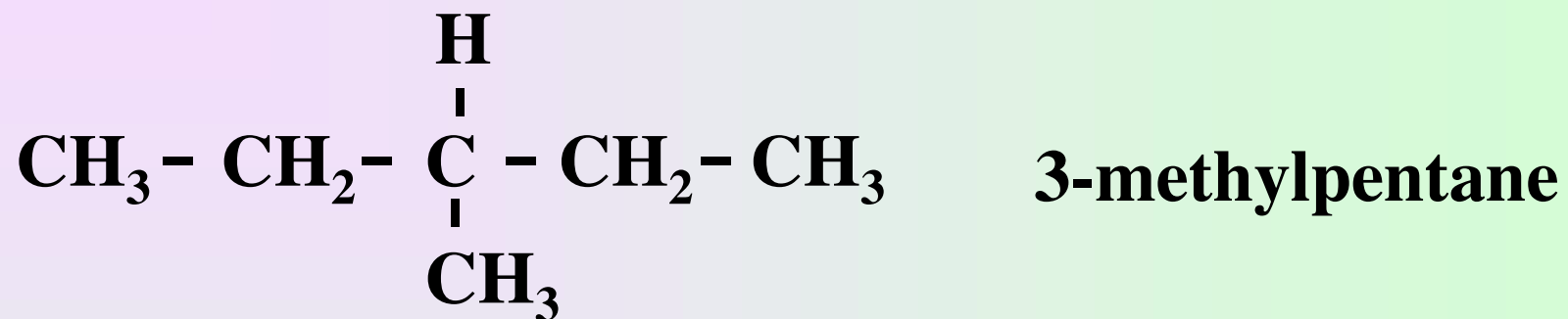
# Alkane Nomenclature

The position of substituent groups are specified by numbering the longest chain of carbon atoms sequentially, starting at the end closest to the substituent.

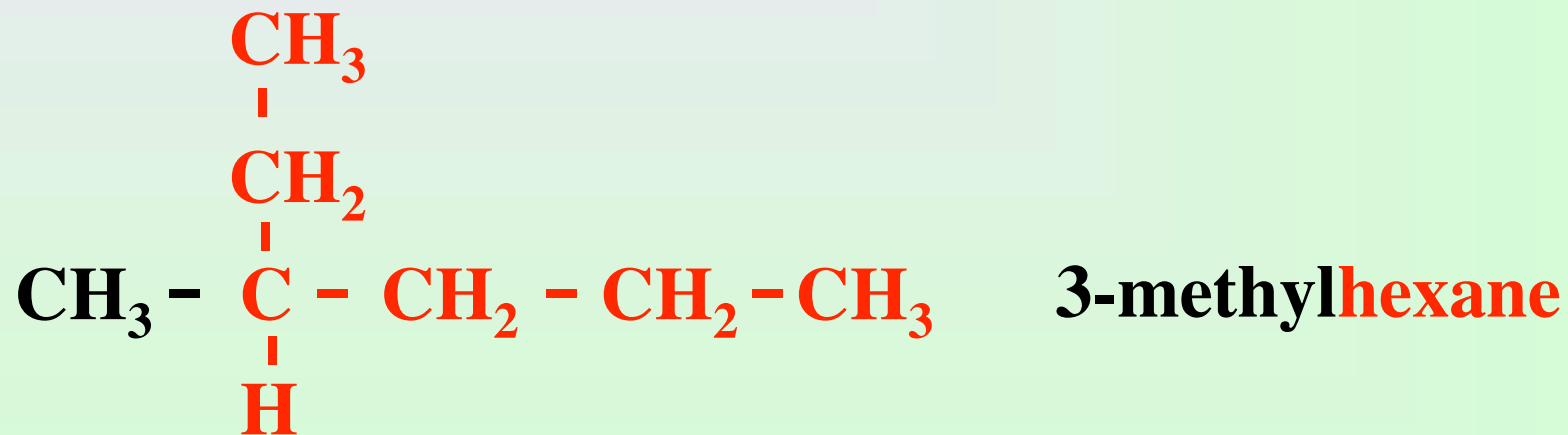
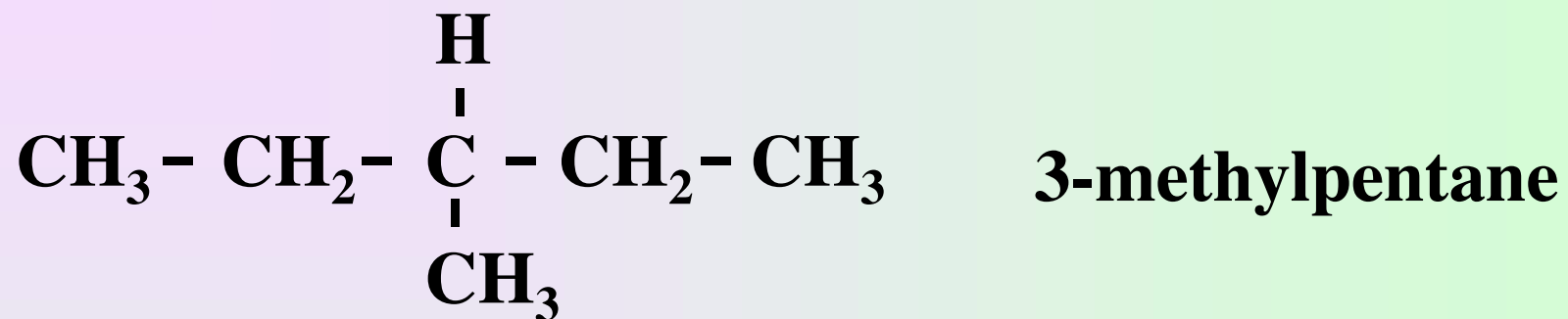


The location and name of each substituent is followed by the root alkane name.

## Example

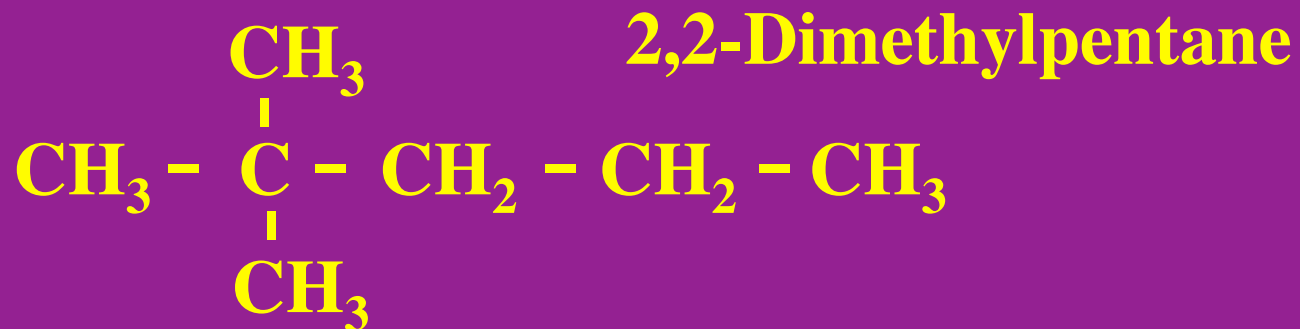


## Example

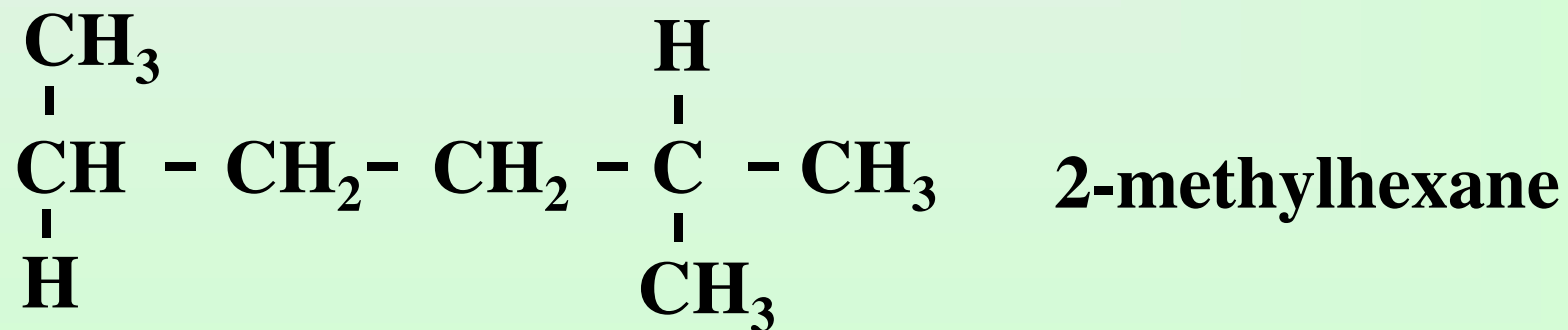
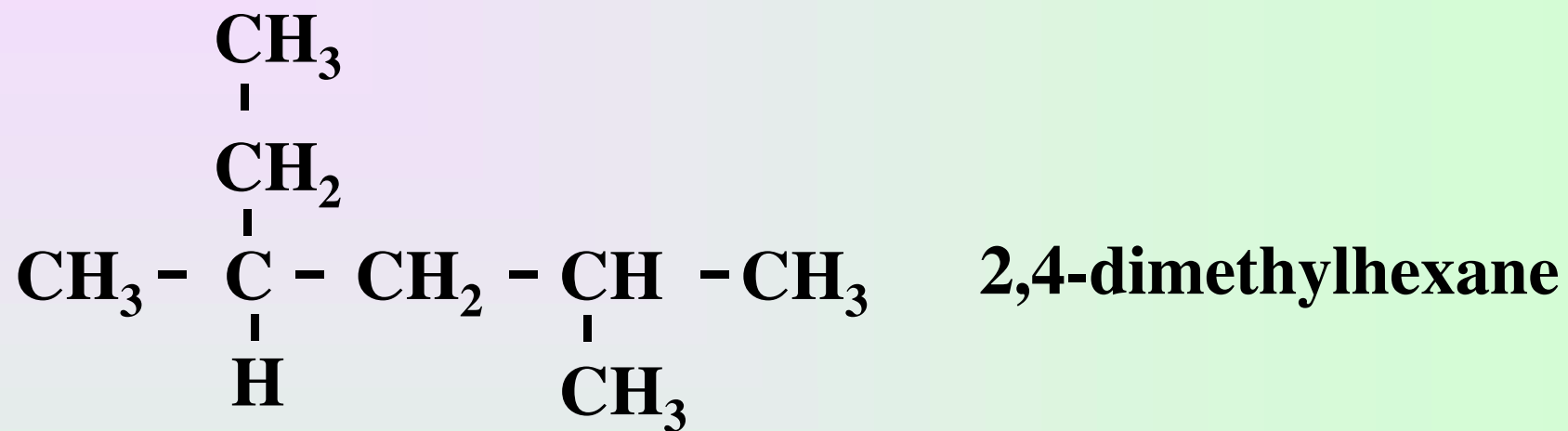


# Alkane Nomenclature

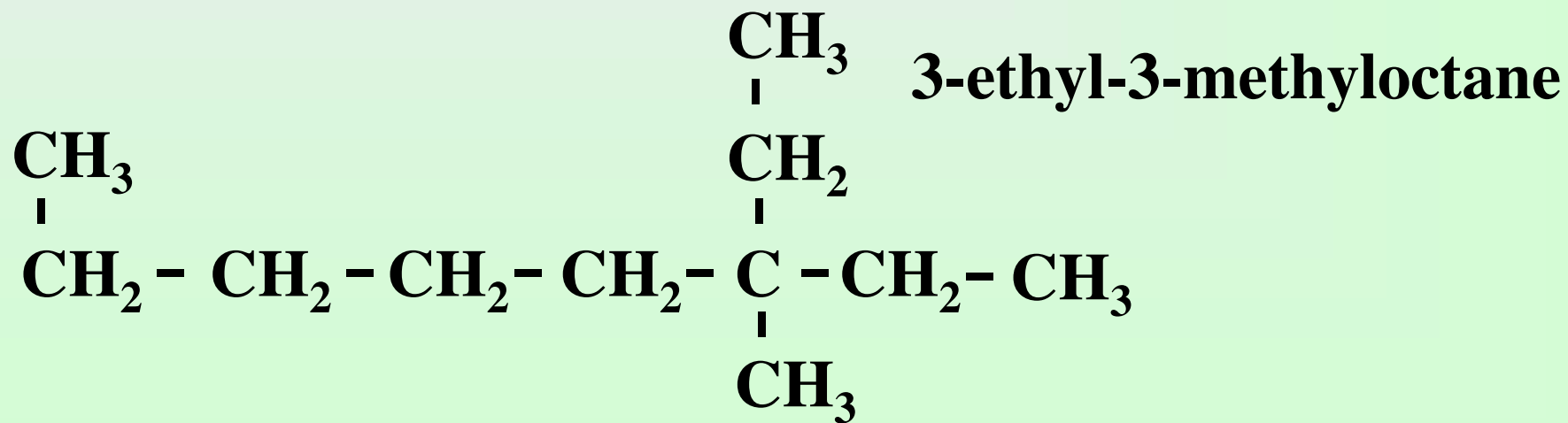
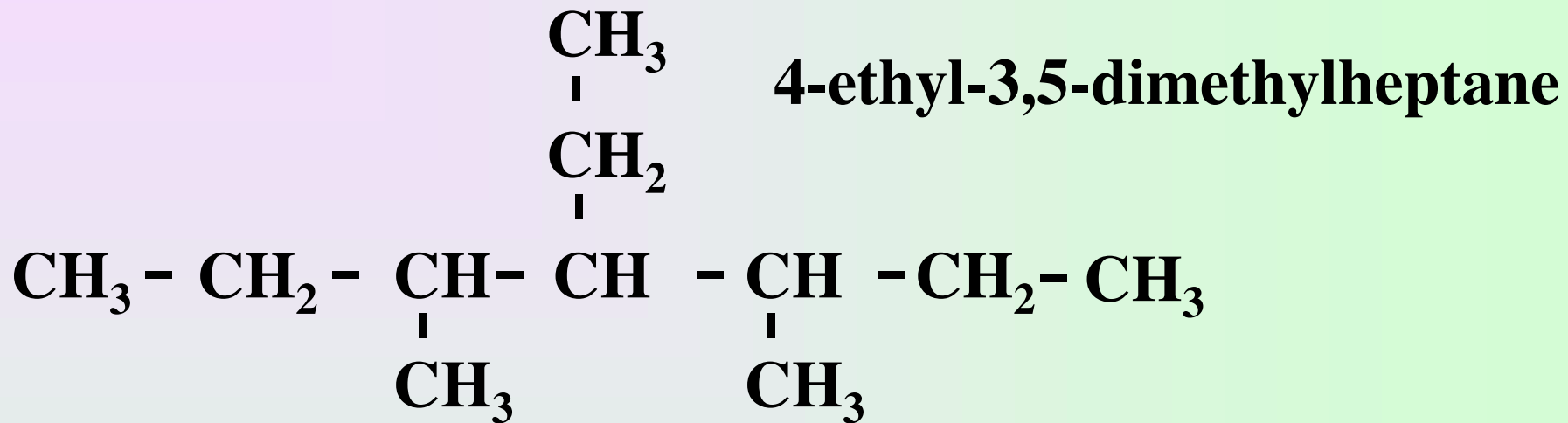
The substituents are listed in alphabetical order, and the prefixes *di-*, *tri-*, and so on are used to indicate multiple, identical substituents.



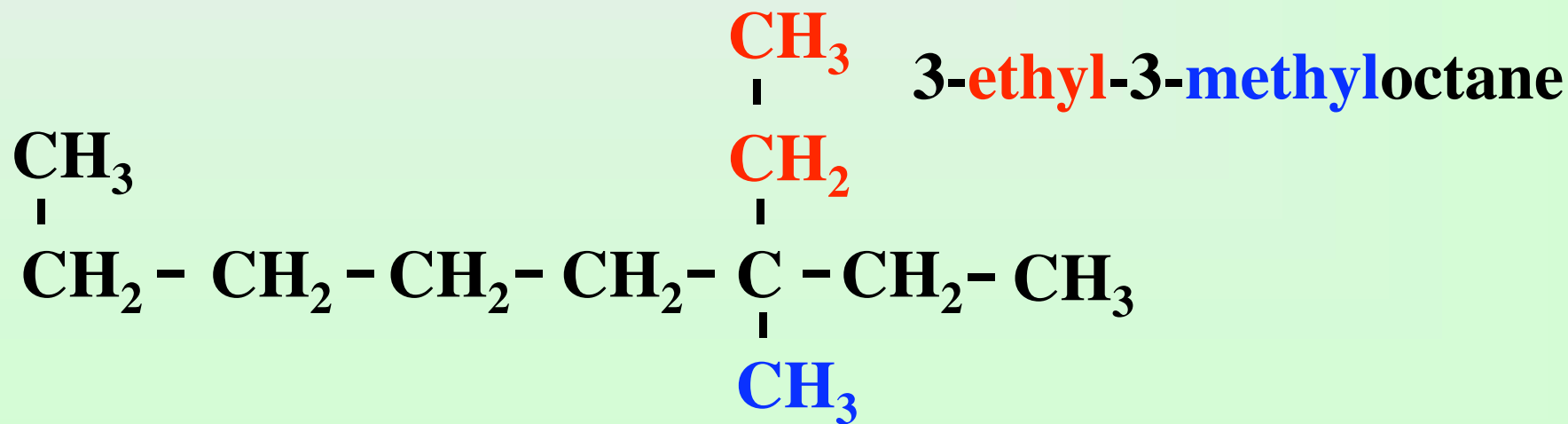
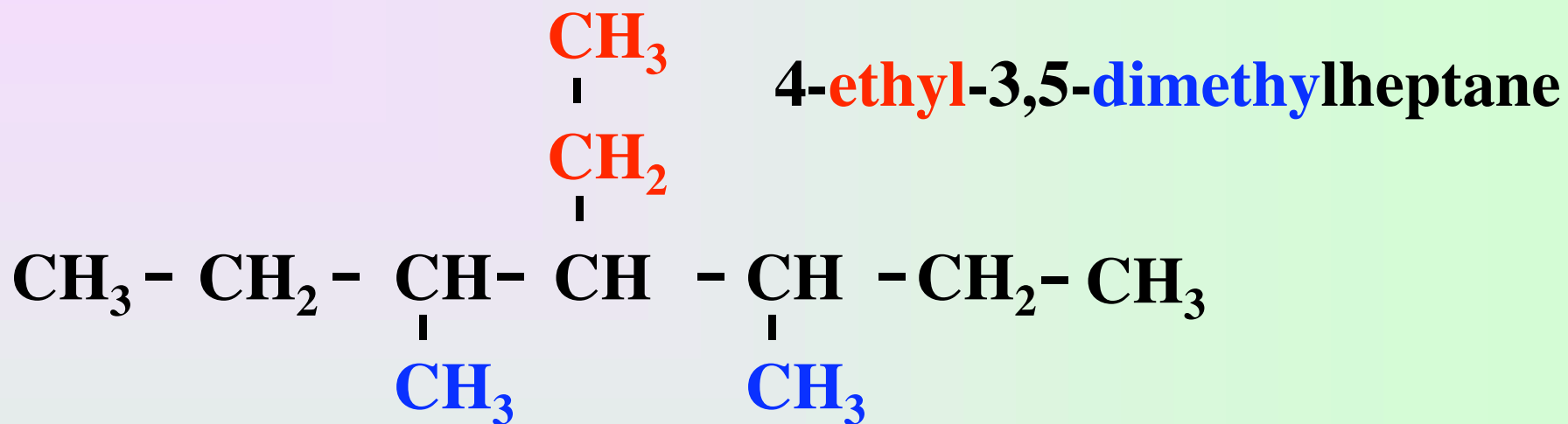
## Example



## Example

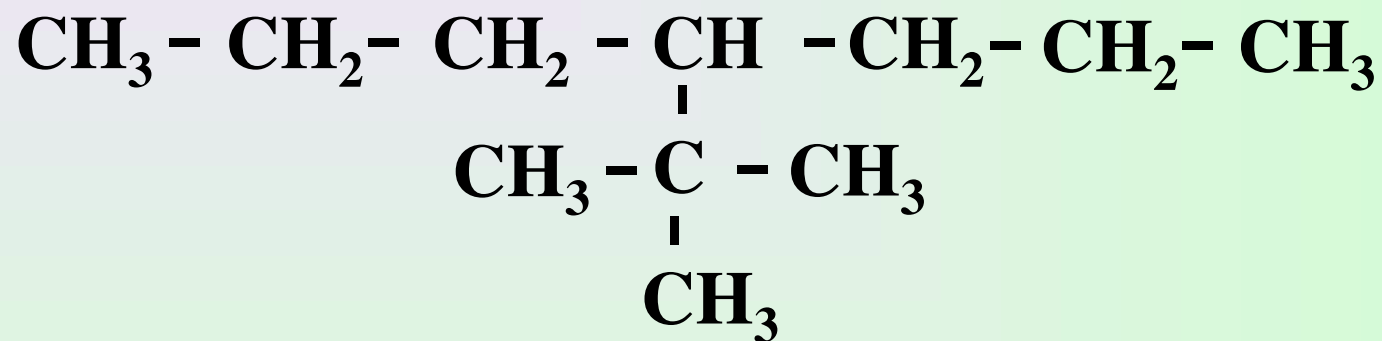


# Example



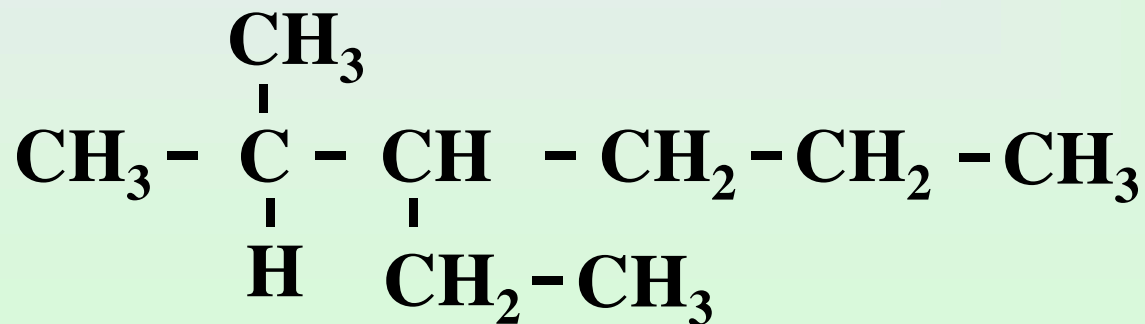
# Example

**4-*tert*-butylheptane**



# Alkane Nomenclature

If two chains of equal length are present, choose the one with the larger number of branch points as the parent.

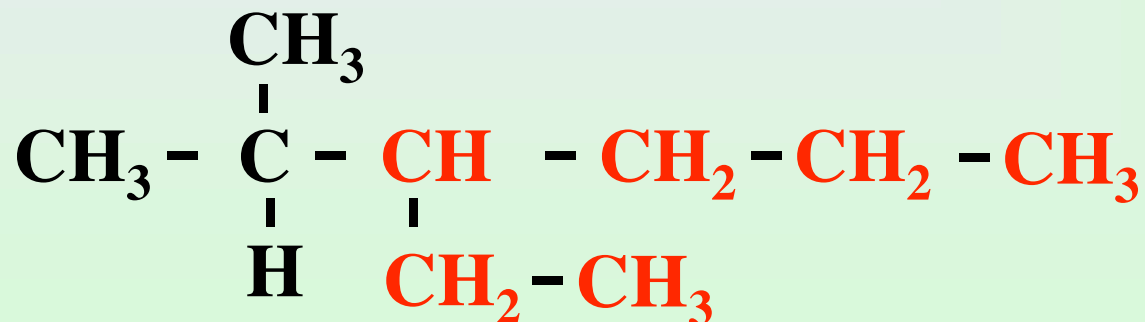


**3-ethyl-2-methylhexane**

# Alkane Nomenclature

If two chains of equal length are present, choose the one with the larger number of branch points as the parent.

**Not**



**3-isopropyl-hexane**