Carbon Chemistry

Carbon Chemistry

- 90% of all known molecules contain a carbon atom
- Almost all these molecules are found in living organisms
- Study of carbon containing compounds is called Organic Chemistry

Reasons Carbon Forms Large Number of Compounds

- Carbon atoms can form bonds with many other Carbon atoms
- Bonds between C atoms can be single, double or triple
- Molecules can be linear chains or have branches
- Same number of carbon atoms can form many different arrangements

Reasons Carbon Forms Large Number of Compounds

- Molecules can even be cyclic, especially if there are 6 carbon atoms to form a ring
- Carbon atoms can form bonds with most other atoms, including metals

Naming Organic Compounds

- The name is determined by the LONGEST chain of carbon atoms that it contains
- Can be difficult to find at times

Basic Prefixes

• $C_1 = meth$

• $C_6 = hex$

• $C_2 = eth$

• $C_7 = hept$

• $C_3 = prop$

• $C_8 = oct$

• $C_4 = but$

• $C_9 = non$

• $C_5 = pent$

• $C_{10} = dec$

Side Chains

- $C_1 = methyl$
- $C_6 = hexyl$
- $C_2 = ethyl$
- $C_7 = heptyl$
- $C_3 = propyl$ $C_8 = octyl$
- $C_4 = butyl$ $C_9 = nonyl$
- $C_5 = pentyl$
- $C_{10} = decyl$

Name this molecule

$$CH_3-CH_2\\ CH_3-CH-CH_2-CH-CH-CH_3\\ |\\ CH_3 CH_2-CH_3$$

Name this molecule

$$CH_{3}-CH_{2}\\ CH_{3}-CH-CH_{2}-CH-CH-CH_{3}\\ |\\ CH_{3}-CH_{2}-CH_{3}\\ |\\ CH_{2}-CH_{3}$$

We need to find the longest chain

Name this molecule

$$CH_3-CH_2\\CH_3-CH-CH_2-CH-CH-CH_3\\ |\\CH_3\\CH_2-CH_3$$

The longest chain

Name this molecule

heptane

$$CH_{3}-CH_{2}\\ CH_{3}-CH-CH_{2}-CH-CH_{3}\\ CH_{3}-CH_{2}-CH_{2}-CH_{3}\\ CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{3}-CH_{3}\\ CH_{3}-$$

The longest chain

Number the carbon atoms

Name this molecule

heptane

$$CH_{3}-CH_{2}\\ CH_{3}-CH-CH_{2}-CH-CH_{3}\\ CH_{3}-CH_{2}-CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{3}-CH_{3}\\ CH_{3}-CH_{3}\\ CH_{3}-CH_{3}-CH_{3}\\ CH_{3}-CH_{3}-$$

Find and name the side chains

Name this molecule

heptane

$$CH_3 - CH_2$$

$$CH_3 - CH - CH_2 - CH_3 - CH_3$$

$$CH_3 - CH_3 - CH_3$$

$$CH_2 - CH_3$$
methyl

Find and name the side chains

Name this molecule

2 - methyl - heptane

$$CH_3 - CH_2$$

Find and name the side chains

Name this molecule

2 - methyl - heptane

$$CH_3 - CH_2$$
 methy $CH_3 - CH - CH_3 - CH_$

Find and name the side chains

Name this molecule

2,5 – dimethyl - heptane

$$CH_{3} - CH_{2}$$

$$CH_{3} - CH - CH_{2} - CH_{3} - CH_{3} - CH_{3}$$

$$CH_{3} - CH_{2} - CH_{3}$$

$$CH_{3} - CH_{2} - CH_{3}$$

Find and name the side chains

Name this molecule

2,5 - dimethyl - heptane

$$CH_3 - CH_2$$
 ethyl

 $CH_3 - CH - CH_2 - CH - CH_3$
 $CH_3 - CH_3 - CH_2 - CH_3$
 $CH_3 - CH_2 - CH_3$
 $CH_3 - CH_2 - CH_3$

Find and name the side chains

Name this molecule

2,5-dimethyl-4-ethyl-heptane

$$\begin{array}{c|ccccc}
CH_3 - CH_2 \\
CH_3 - CH - CH_2 - CH_3 - CH_4 - CH_5 \\
CH_3 - CH_2 - CH_3 \\
CH_3 - CH_2 - CH_3
\end{array}$$

Name this molecule

2, 5-dimethyl-4-ethyl-heptane

$$CH_{3} - CH_{2}$$

$$CH_{3} - CH - CH_{2} - CH - CH_{3}$$

$$CH_{3} - CH_{2} - CH_{3} - CH_{2} - CH_{3}$$

$$CH_{3} - CH_{2} - CH_{3}$$

If the numbers on the C atoms are reversed

Name this molecule

2,5-dimethyl-4-ethyl-heptane

$$CH_{3}-CH_{2}\\CH_{3}-CH-CH_{2}-CH-CH_{3}\\CH_{3}-CH_{3}\\CH_{3}\\CH_{2}-CH_{3}\\CH_{2}-CH_{3}$$

If the numbers on the C atoms are reversed

Name this molecule

3,6 - dimethyl - 4 - ethyl - heptane

$$CH_{3}-CH_{2}\\ CH_{3}-CH-CH_{2}-CH-CH_{3}\\ CH_{3}-CH_{3}-CH_{2}-CH_{3}\\ CH_{3}-CH_{3}-CH_{3}\\ CH_{3}-CH_{3}\\ CH_{3}-CH_{3}\\$$

The name becomes

Name this molecule

$$CH_{3}-CH_{2}\\ -CH_{3}-CH-CH_{2}-CH_{3}-CH_{3}-CH_{3}\\ -CH_{3}-CH_{2}-CH_{3}\\ -CH_{3}-CH_{3}-CH_{3}$$

Both names are correct

2.5 - dimethyl - 4 - ethyl - heptane

3,6 - dimethyl - 4 - ethyl - heptane

Functional Groups

- When a hydrogen atom is replaced in an alkane by another atom
- The three to be considered this year are
- - Cl chloro
- – OH hydroxy or alcohols
- -COOH carboxy or carboxy acids

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