CHEMISTRY

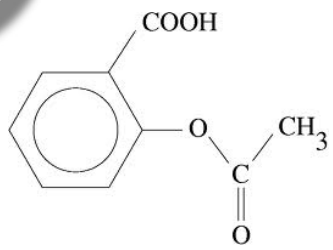
FUNCTIONAL GROUPS

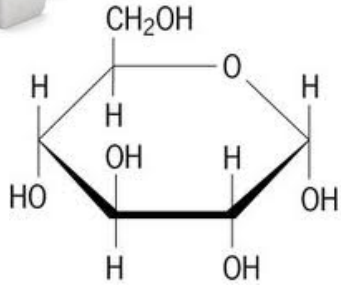
Functional Groups

There are many different groups of side-chains that can be connected to or incorporated within hydrocarbons. These specific groups of atoms are called functional groups and each have their own individual name.

The addition of a functional group will change the chemical properties of the hydrocarbon. These properties can range from solubility, state at room temperature, boiling/melting points, even the colour of flame produced upon combustion.

Understanding the effects of the functional groups allows chemists to predict the properties of organic compounds in order to design new compound. These new compounds can range from high-tech fabrics like a wet suit to modern medications.





CHEMISTRY

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Simple Functional Groups

The simplest of functional groups are side-chains that consist of a single element. Similar to naming other side-chains, one must identify where the element is connected to the main chain. The name of the element is then shortened by removing the last syllable and adding an 'o'.

Note: Watch out for the oxidation state of the element as this will tell you how many bonds it makes to its carbon.

ELEMENT	NAME AS A SIDE-CHAIN
Chlorine	Chloro
Bromine	Bromo
Chromine	Chromo

Examples: Draw the following hydrocarbons ...

1. 3-Flourohexane

2. 3,5-distrontio-1,7-octadiene

3. 3,4,6-trichloro-1-cycloheptyne

CHEMISTRY

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MORE COMPLEX FUNCTIONAL GROUPS and SIDE CHAINS

Of course, functional groups can get more complicated. Sometimes a functional group may consist of a carbon ring (the phenyl group)or perhaps a standard branch bonded in the middle instead of the end.

NOTE: "iso" means middle
"sec" means secondary or secoond

Ex: 4-phenyl-2-hexyne

Ex: 6-butyl-1,2-decadiene vs. 6-secbutyl-1,2-decadiene

Ex: 2-phenyl-2-isopropylpropane

CHEMISTRY

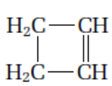
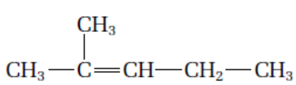
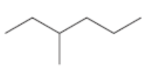
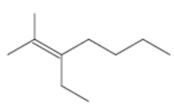
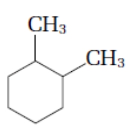
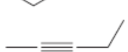
WORKSHEET - FUNCTIONAL GROUPS

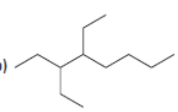
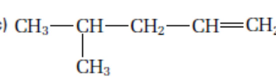
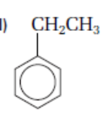
6. Draw a condensed structural diagram for each hydrocarbon.
   (a) propane
   (b) 4-ethyl-3-methylheptane
   (c) 3-methyl-2,4,6-octatriene

7. Identify any errors in the name of each hydrocarbon.
   (a) 2,2,3-dimethylbutane
   (b) 2,4-diethyloctane
   (c) 3-methyl-4,5-diethyl-2-nonyne

8. Correct any errors so that each name matches the structure beside it.
   (a) 4-hexyne $CH_3—CH_2—CH=CH—CH_2—CH_3$
   (b) 2,5-hexene $CH_3—C≡C—C≡C—CH_3$

9. Use each *incorrect* name to draw the corresponding hydrocarbon. Examine your drawing, and rename the hydrocarbon correctly.
   (a) 3-propyl-2-butene
   (b) 1,3-dimethyl-4-hexene
   (c) 4-methylpentane

5. Name each hydrocarbon.
   (a) $H_3C—CH_3$
   (b) 
   (c) 
   (d) 
   (e) 
   (f) 
   (g) 

1 K/U Name each hydrocarbon.
   (a) $CH_3—CH_2—CH_2—CH_2—CH_2—CH_2—CH_3$
   (b) 
   (c) 
   (d) 

2 C Draw a condensed structural diagram for each hydrocarbon.
   (a) cyclopentane
   (b) 2-methyl-2-butene
   (c) 1,4-dimethylbenzene (common name: *para*-xylene)
   (d) 3-ethyl-2,3,4-trimethylnonane