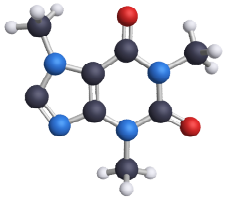
Name: _____ **Date:** _____ **Class Notes**
IPC

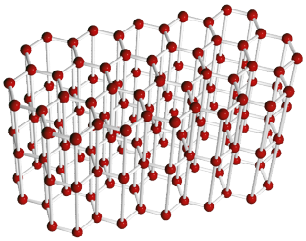
Carbon and its Compounds

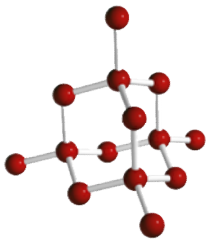


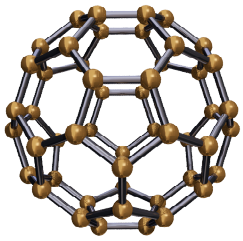
Because of its structure and chemical properties, carbon is found in more compounds than any other element. Carbon plays such an important role in the world around us that it has been given its own category in chemistry known as **organic chemistry**. Thus, organic chemistry is the study of carbon and its compounds.

What makes carbon so special? Carbon has the unique ability to bond with like atoms. Something most other elements rarely do. This ability allows pure carbon to have three different forms: the diamond, graphite and fullerenes. Also, carbon has four valence electrons which allows it to form four covalent bonds. These bonds can be single, double or triple bonds. Thus, carbon can form molecular structures with long chains, branched chains, rings and rings with chains for a vast variety of compounds.

Forms of Pure Carbon







Properties of Carbon

1. _____
2. _____
3. _____
4. _____
5. _____

Organic compounds consist of mostly carbon and hydrogen atoms often combined with other elements. The properties of organic compounds differ from those of **inorganic compounds**. Organic compounds have low melting and boiling points, solubility in organic solvents rather than water, and poor electrical conductivity. Organic reactions are usually slow and produce low yields of product because of the many side reactions that can occur.

There are millions of known organic compounds, but the elements they contain are relatively few. Besides, carbon and hydrogen, there is oxygen, nitrogen, sulfur, phosphorus and the halogens. The variety of organic compounds is mainly due to the many different arrangements, or structures, that are possible. The chemical and physical properties of these compounds are related to the structures of their molecules. Thus, the key to understanding organic chemistry is to obtain an understanding of carbon's structure and bonding.

Organic chemistry is a major part of our lives, from simple sugars and amino acids to the complex enzymes and huge DNA molecules. It is involved in the development of the food we eat; the clothes we wear; the plastics and polymers that are all around us; the medicines we use; our fuels, pesticides, poisons, soaps and detergents. Although organic chemistry started out as the study of living matter, today many of the organic compounds are synthetic and are derived from petroleum or natural gas.

Organic Compounds

Organic Compound Properties

1. _____
2. _____
3. _____
4. _____

Think It Through

- Why is carbon found in more compounds than any other element?
- What is organic chemistry?
- Why is carbon special?
- What are the three forms of carbon?
- What are the properties of carbon?
- What type of covalent bonds can carbon form?
- What Structures can carbon form?
- What are the properties of organic compounds?
- How the properties of organic compounds related?
- Besides carbon and hydrogen, what are some other elements in organic compounds?
- List some ways organic chemistry affects our everyday lives

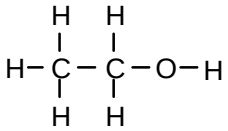
ORGANIC FORMULAS

References to organic compounds may be made by name or by formula, but the variations in structures have resulted in three different types of formulas: the molecular formula; the structural formula; and the condensed structural formula.

Molecular formula - indicates the type and number of each element in the compound but gives no information about the bonds or structure.

$C_2 H_5 OH$

Structural formula - indicates the complete two-dimensional structure of the compound, showing all the bonds present.



Condensed structural formula - a shorthand representation that leaves the bond lines out, but still indicates what is bonded to each carbon or other atom.

$CH_3 CH_2 OH$

Line structural formula - a shorthand representation with lines in which every endpoint represents a carbon atom and hydrogen atoms are assumed.

In order to name organic compounds, you must learn some prefixes, the basic structures of the hydrocarbons and the functional groups.

Organic Prefixes

1 = meth-	2 = eth-	3 = prop-	4 = but-	5 = pent-
6 = hex-	7 = hept-	8 = oct-	9 = non-	10 = dec-

Greek Prefixes

1 = mono-	2 = di-	3 = tri-	4 = tetra-	5 = penta-
6 = hexa-	7 = hepta-	8 = octa-	9 = nona-	10 = deca-

Substitute Groups

$-CH_3$	methyl	-Cl	chloro
$-CH_2CH_3$	ethyl	-F	fluoro
$-CH_2CH_2CH_3$	propyl	-Br	bromo
$-CH_2CH_2CH_2CH_3$	butyl	$-C_6H_6$	phenyl

"Genius is the ability to reduce the complicated to the simple."
- C. W. Ceran