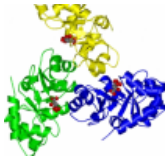
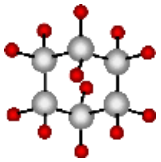


Organic Chemistry



Organic chemistry is the study of the molecular compounds of carbon. The properties of organic compounds depends upon the covalent bonding within the molecules (electronegativity difference less than 1.67).
Oxides of carbon, compounds of carbonate (CO_3^{2-}), Na_2CO_3 bicarbonate (HCO_3^-), cyanide (CN^-), cyanate (CNO^-) and thiocyanate (SCN^-) are not classified as organic compounds.

The number and variety of organic compounds is much greater than inorganic compounds due to:

- the ability of organic compounds to form isomers
- the intermediate electronegativity of carbon allows it to bond to metals and non- metals.

Organic compounds tend to have a larger molecular mass and radius due to the catenation (chain linking) of carbon atoms.

Variety of organic compounds is influenced by:

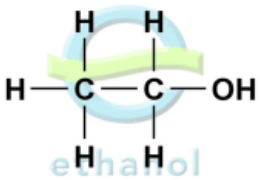
(i) carbons ability to form **4 hybridized bonds** (bonding capacity)

IMPORTANT

(ii) carbons ability to form double and triple bonds

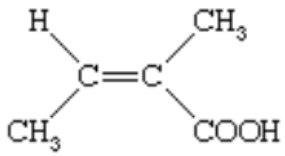
(iii) carbons ability to form chains and cyclic compounds

Ex. (i)

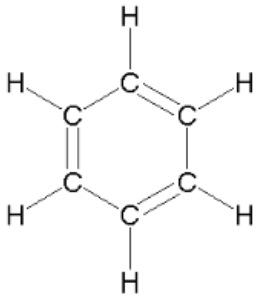


ethanol

(ii)



(iii)



H-C≡C-H

C_7H_{16}

Ionic

- metal / nonmetal
- transfer electrons
- Ex. NaCl

Na^+ Cl^-

Molecular

- nonmetals
- share electrons
- Ex. CO_2

4.0 2.1

F : H

2.5 2.1

C : H

Table 6.2

Electronegativity Values for Selected Elements

H 2.1						
Li 1.0	Be 1.5	B 2.0	C 2.5	N 3.0	O 3.5	F 4.0
Na 0.9	Mg 1.2	Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0
K 0.8	Ca 1.0	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8
Rb 0.8	Sr 1.0	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5
Cs 0.7	Ba 0.9	Tl 1.8	Pb 1.9	Bi 1.9		

Structural Models and Diagrams

A variety of models exist to communicate how atoms are bonded to form molecules. These types of models include:

Molecular formula - works well for small, simple molecules. As the number of atoms increase, less is known about the structure of the molecule.

Count the atoms!

Ex. H_2O, CH_4, C_2H_6

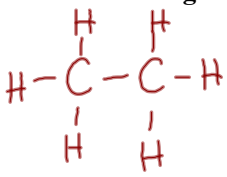
Expanded molecular formula - shows the arrangement of atoms within a molecule

Ex. CH_3CH_3

Bonding Capacity Revie

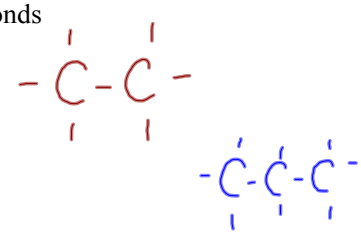
Complete structural diagram - shows all atoms and bonds

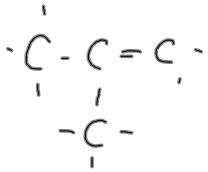
Ex.



Condensed structural diagram - shows the C-C bonds, but omits the C-H bonds

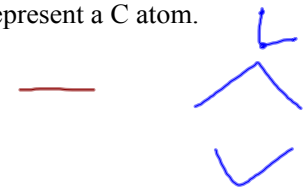
Ex.

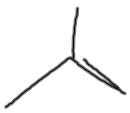




Line Diagram - shows bonds, but no atoms. The end of each line segment represent a C atom.

Ex.





** Isomers - compounds with the same molecular formula, but different structures**

Ex. C_4H_{10}

How many isomers can be drawn for C_2H_6?

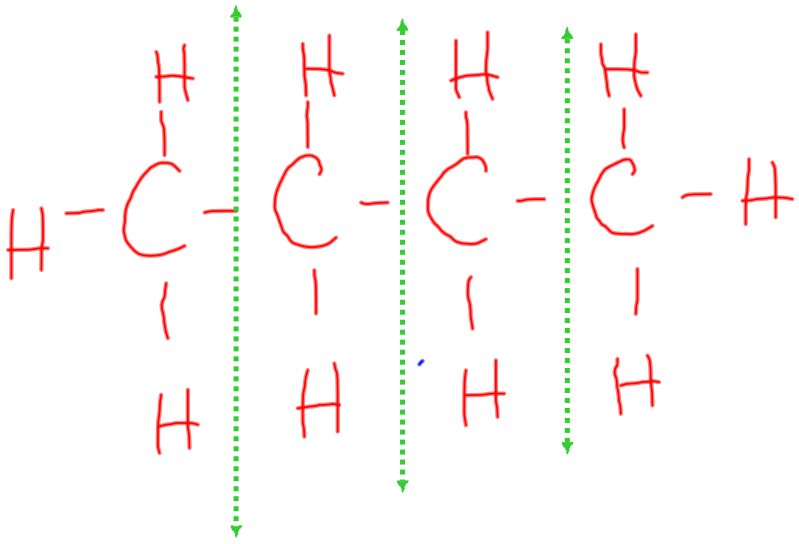
For C_5H_{12}?

C_4H_{10}

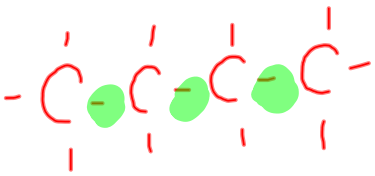
Expanded:

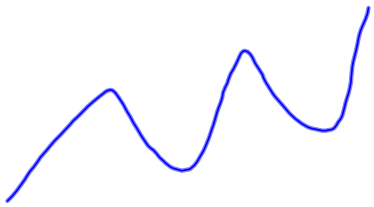
$CH_3CH_2CH_2CH_3$

Complete:

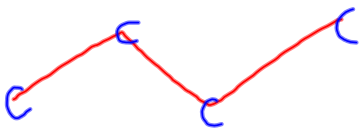


Condensed:





Line:



Bonding Capacity

An atom's bonding capacity is the maximum number of covalent bonds the atom can form.
(found by element's location in periodic table)