

Ch. 1 - The Basics

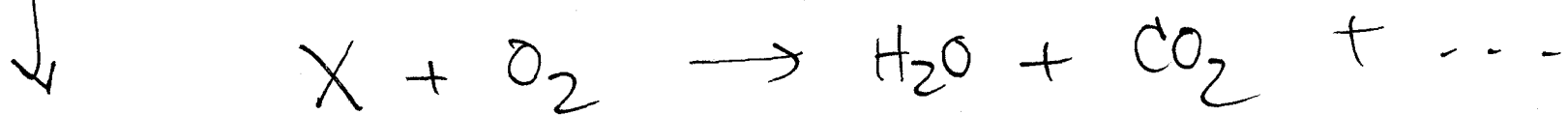
- organic chemistry as an entity -
differentiated from inorganic in 1780s.

organic chemicals - those isolated from
living organism.

Now: organic chemistry is the study of
compounds containing carbon + hydrogen.

1784 - Lavoisier - empirical/mol. formulas

↓ * combustion analysis



1860

late 1800s - structural Theory of Organic chemistry

1. The atoms of elements in organic compounds can form a fixed # of bonds, using the e's in outermost shell (valence e's).

C - tetravalent - forms 4 bonds

H - monovalent - forms 1 bond

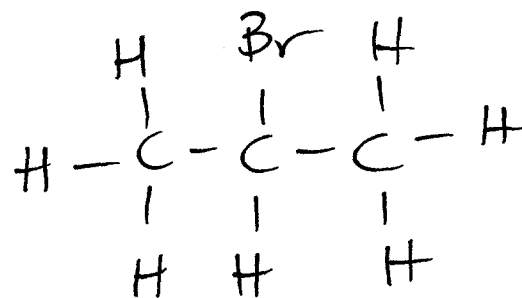
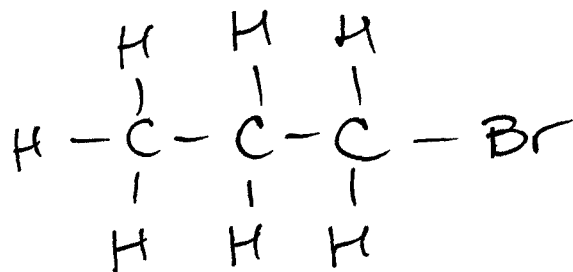
O - divalent

N - trivalent

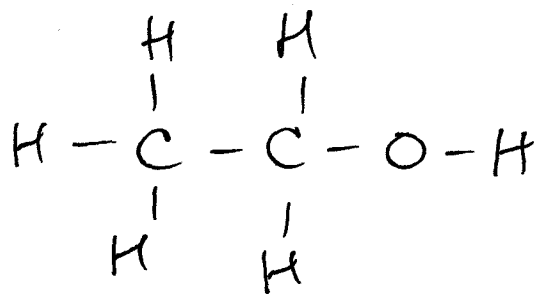
X (halogens) - monovalent

2. A carbon atom can use one or more of its valences to form bonds to other carbons.

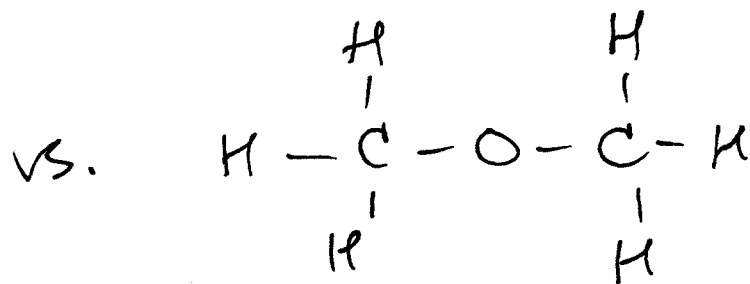
Isomers - compounds w/ same molecular formula but different arrangement of atoms. (aka structural + constitutional isomers)



Isomers have different chemical + physical properties - they are different molecules!



ethyl alcohol
b.p. 78.5°C



dimethyl ether
b.p. -24.9°C

The way a molecule behaves is directly related to the atoms + the bonds.

everyone wants a noble gas configuration.

metals tend to lose e's

nonmetals tend to gain e's

* directly related to e'neg.

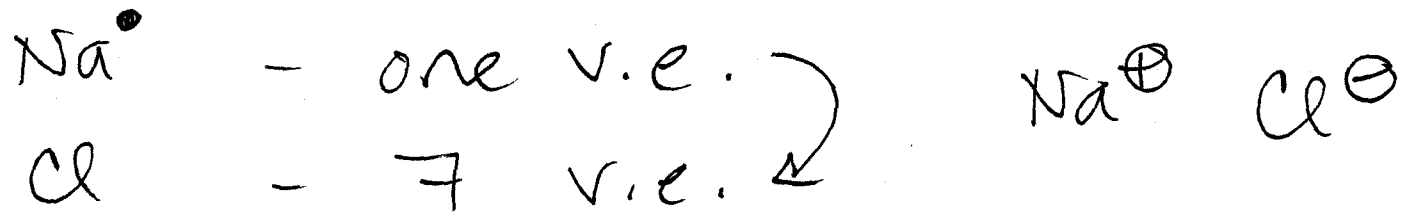
* more e'neg elements hold onto their e's + try to get more e's.

extra e's \Rightarrow anion (negatively charged)

given up e's \Rightarrow cation (positively charged)

opposite charges attract -
form ionic bonds.

unionized



There are very few ionic bonds in organic molecules.

1916 - Gilbert Lewis (Weymouth)

Hydrogen atom - only has one e'. H^\bullet

If two H atoms share their e's, we now have a noble gas (He) config.



Sharing e's forms a covalent bond

Amt. of energy required to break a covalent bond homolytically (one e^- back to each atom) \Rightarrow bond dissociation energy.

most (virtually all) organic molecules are held together by covalent bonds.

- * Both atoms are the same - equal sharing
nonpolar covalent
- * Atoms have differing e^- neg - unequal sharing
polar covalent

(* Big enough e^- neg difference \Rightarrow ionic)