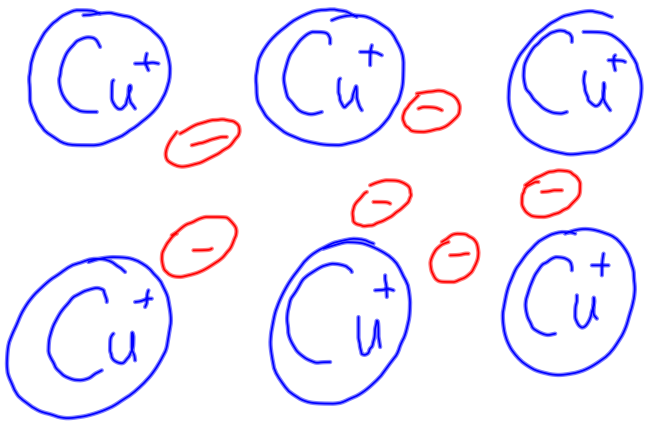
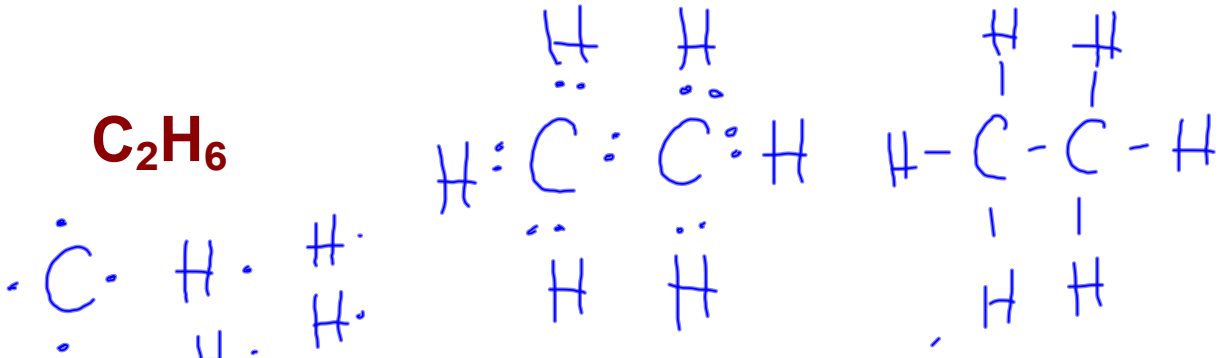
Unit 3 - Chemical Bonding

- Electron Configurations
- Octet Rule
- Electron Dot Structure
- Metallic Bonding
- Covalent Bonding
- VSEPR Theory
- Hybridization
- Polarity
- Intermolecular Forces


Cu+
Cu+
Cu+
Cu+
Cu+
Cu+

Electron Dot Structures and Hybridization

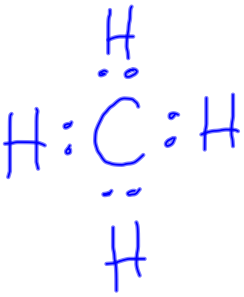
C_2H_6

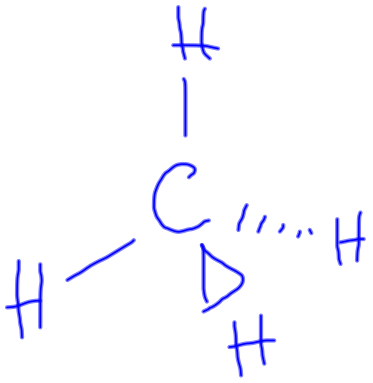


NH_3

CH_2O

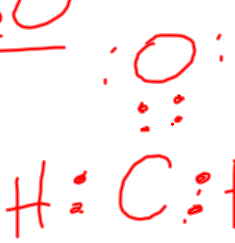
CH_4

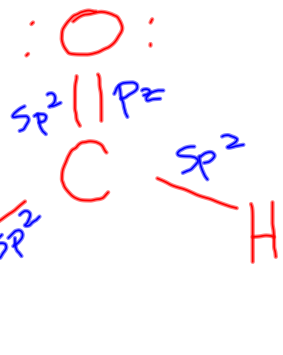




tetrahedral

CH_2O



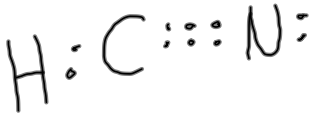


trigonal planar

$S + P_x + P_y \rightarrow Sp^2 + Sp^2 + Sp^2$

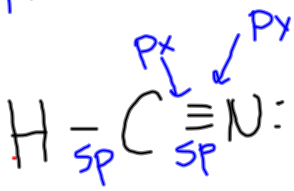
P_z

HCN



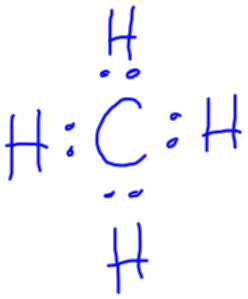
$S + P_z \rightarrow Sp + Sp$

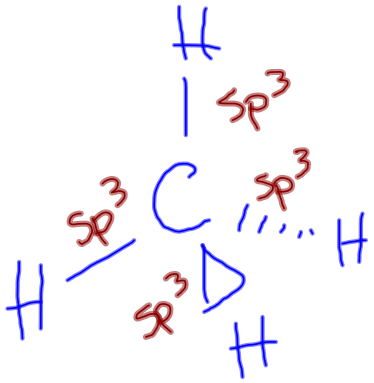
P_x, P_y

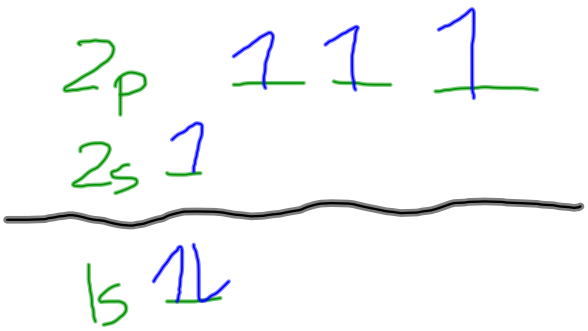


linear

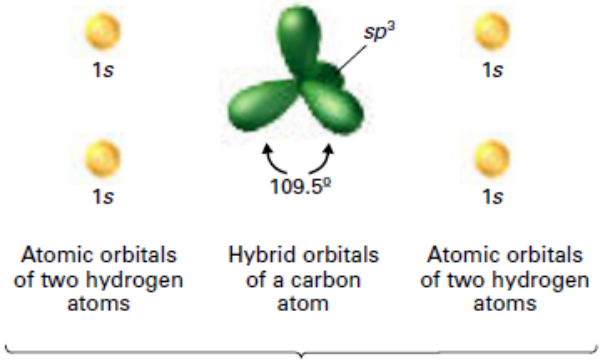
CH_4

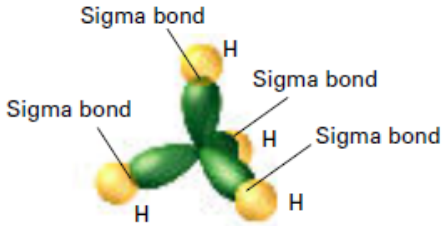






$S + p_x + p_y + p_z \longrightarrow sp^3 + sp^3 + sp^3 + sp^3$



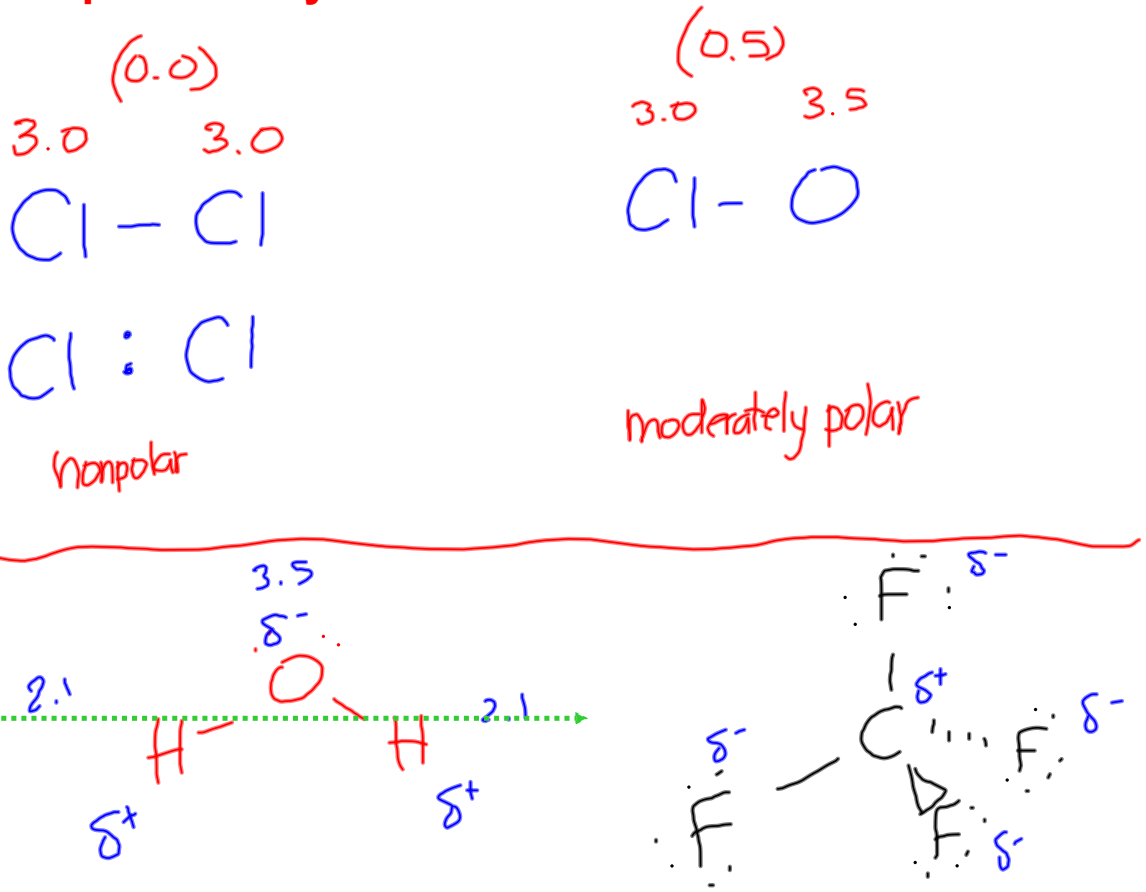


Methane molecule

Table 8.3 Electronegativity Differences and Bond Types

Electronegativty difference range	Most probable type of bond	Example
0.0-0.4	Nonpolar covalent	H - H (0.0)
0.4-1.0	Moderately polar covalent	H - Cl (0.9)
1.0-2.0	Very polar covalent	H - F (1.9)
≥ 2.0	Ionic	Na^+ Cl^- (2.1)

*** No sharp boundary between ionic and covalent**



Attraction Between Molecules

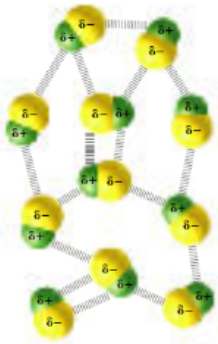
Intermolecular forces are weaker than both ionic and covalent bonds.

Van der Waals Forces

-Weakest attractions between molecules.
-Can be separated into two categories:

Dipole Interactions

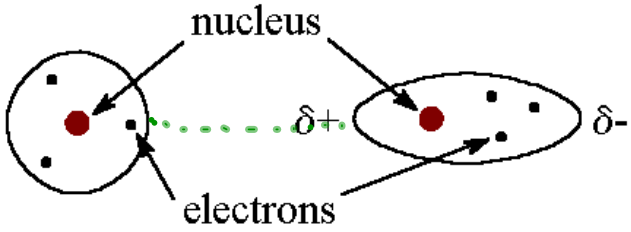
Electrical attraction between oppositely charged regions of polar molecules.



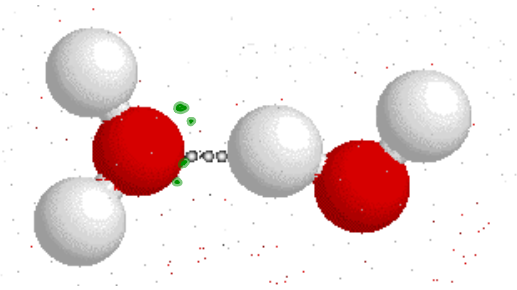
Dispersion Forces (London Dispersion Forces)

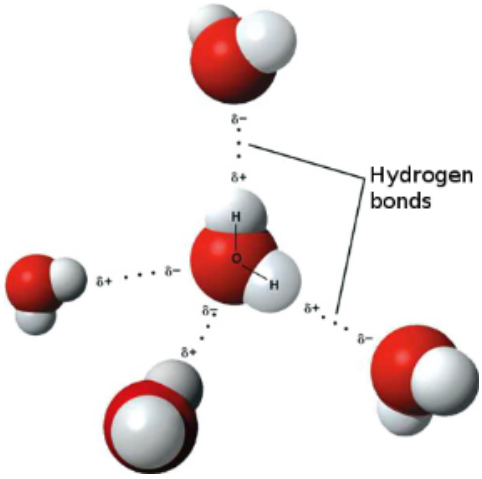
-weakest of all molecular interactions
-occur between even non-polar molecules
-caused by the motion of electrons

when moving electrons are momentarily on one side of a molecule, the electrons of the neighbouring molecule will move t the opposite side, causing a weak attraction.



Hydrogen Bonds





Hydrogen Bonds

Strong attractive forces in which a hydrogen covalently bonded to a very electronegative atom (O, N, F), is weakly bonded to an unshared electron pair of another electronegative atom.

- strongest intermolecular force
- not as strong as an ionic or covalent bond