

# ORGANIC CHEMISTRY

## What is organic?

Carbon-Carbon bond

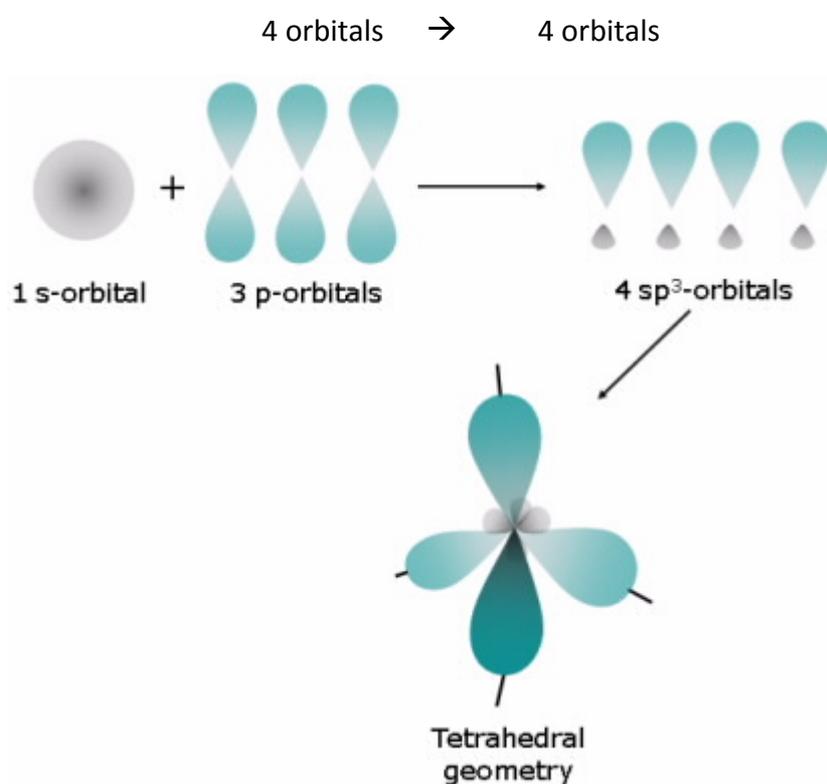
& } Strong and unreactive

Carbon-Hydrogen bond

**C [1S<sup>2</sup> 2S<sup>2</sup> 2P<sup>2</sup>]**

# Carbon hydrogen single bond: C-H

e.g. CH<sub>4</sub>



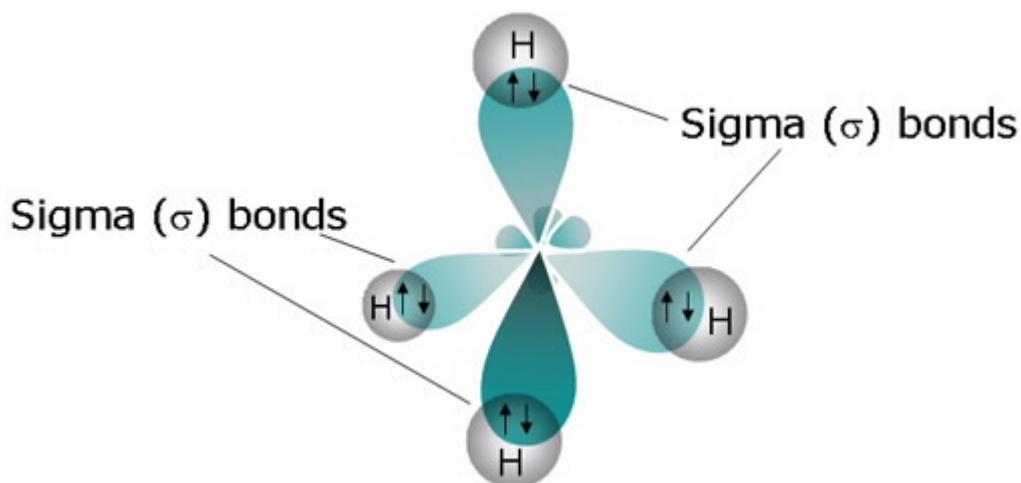
Atomic orbital not molecular orbital! Because C has no any atoms bind to it yet.

**Remark: There are 3 p orbitals and 1 s orbital. So the hybridized sp<sup>3</sup> orbital has  $\frac{3}{4}$  p orbital property and  $\frac{1}{4}$  s orbital property.**

## Why is tetrahedral geometry?

The best way to keep electron away from each other.

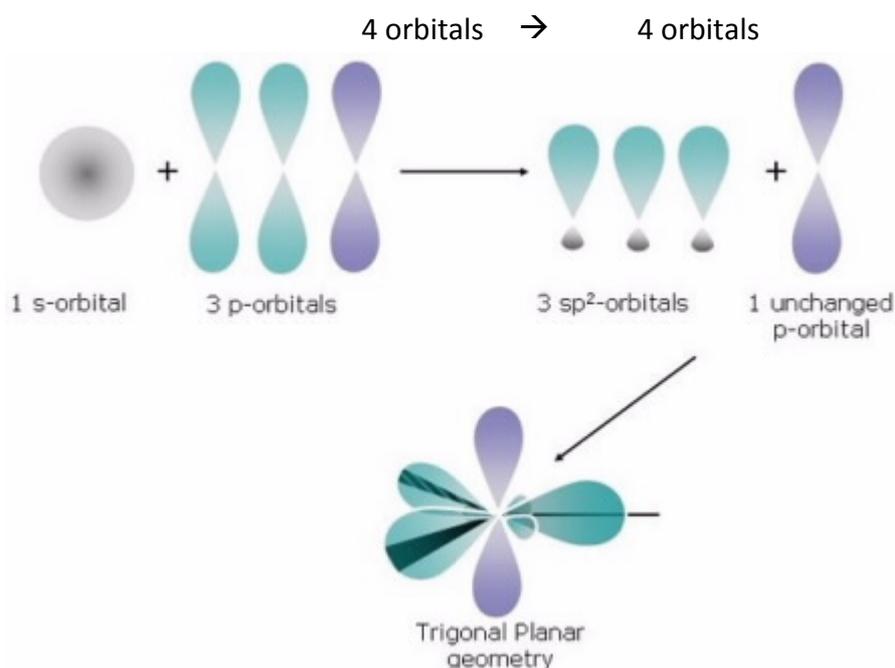
## Sigma bond formation



This is the molecular orbital. The  $sp^3$  orbital which has one electron in it overlap with the s orbital of H which also has one electron, forming a sigma bond.

## # Carbon carbon double bond: C=C

e.g.  $\text{CH}_2=\text{CH}_2$



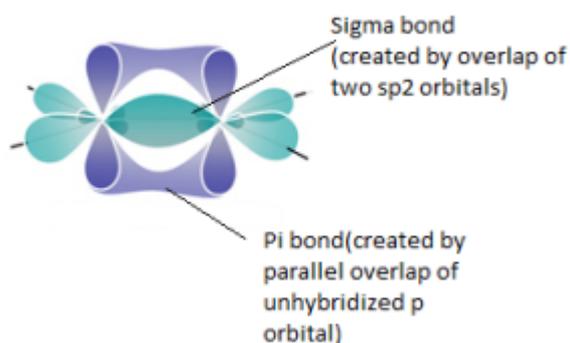
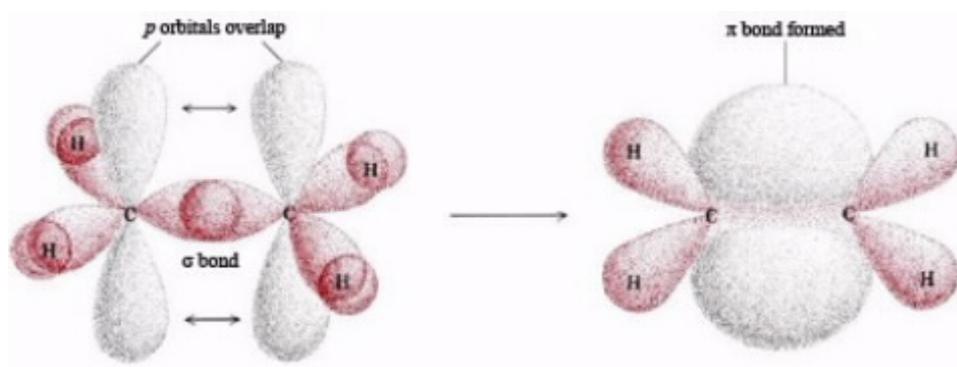
This is the atomic orbital.

**Remark:** There are 2 p orbitals and 1 s orbital that are hybridized. So the hybridized  $sp^2$  orbital has 2/3 p orbital property and 1/3 s orbital property. The left over p orbital does not change its property.

**Why is trigonal planar geometry?**

Same reason! To make 3  $sp^2$  far away from each other.

## Pi bond formation



**Remark:** sigma bond strong rotate  $\rightarrow$  still attach end to end

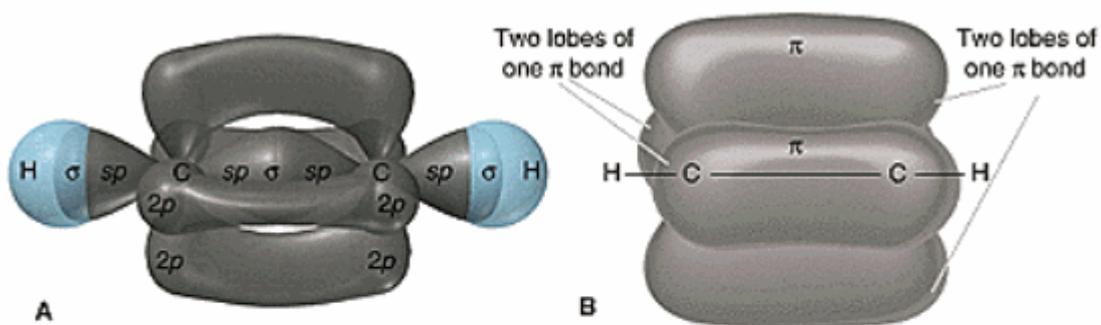
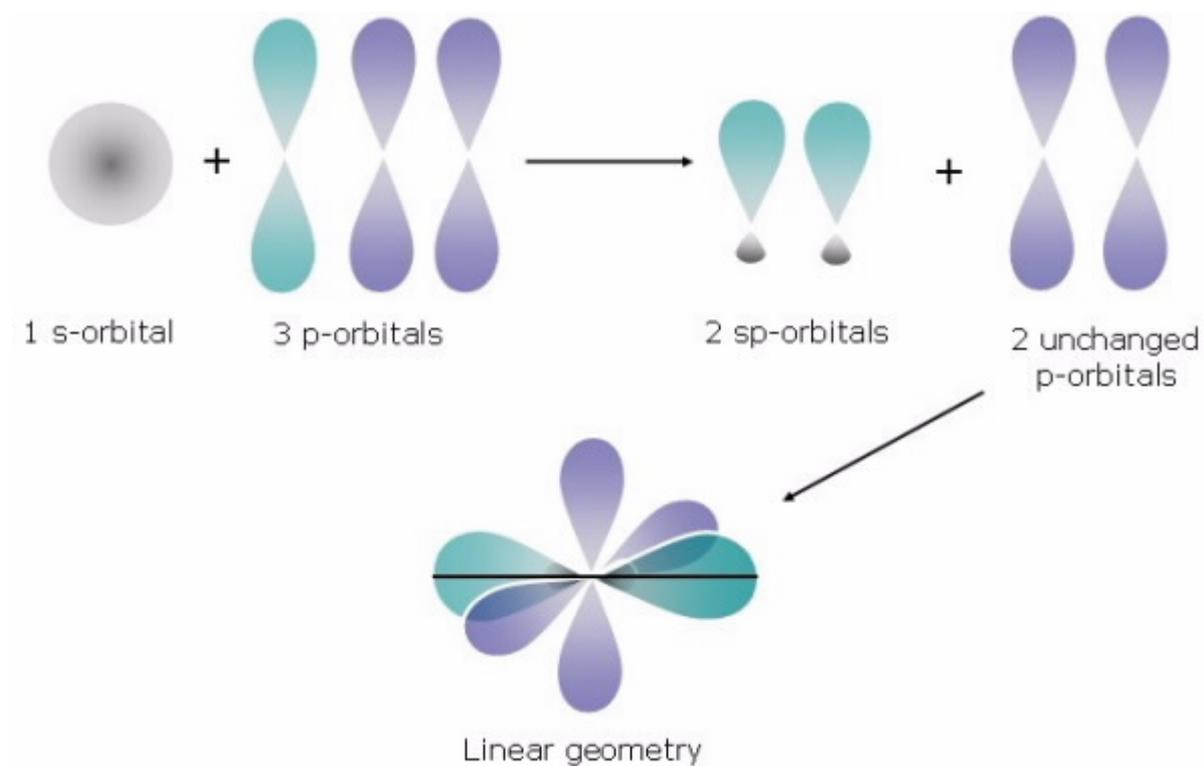
Pi bond weaker rotate  $\rightarrow$  different distribution of electron

\*surround the sigma bond

\*larger surface of electron distribution

# # Carbon carbon triple bond: $C\equiv C$

e.g.  $HC\equiv CH$



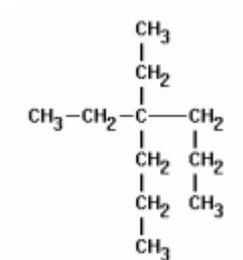
## # Other elements properties

Element	N	O	F
Orbital	$1S^22S^22P^3$	$1S^22S^22P^4$	$1S^22S^22P^5$
# Valence shell	5	6	7
# Electrons to fill up the shell	3	2	1
# Protons	7	8	9
Electronegativity	-	--	---
# bond	3 covalent bond with 1 lone pair	2 covalent bond with 2 lone pair	1 covalent bond with 3 lone pair

## # Nomenclature

Remark: The information may be too much for beginners. I didn't learn them all in one day. Lecturers will state the related rules while introducing the reactivity of each functional group. So this is just a summary. Please note that we do need to know the name of simple organic compound.

### Alkane: C-C & C-H only



Example: