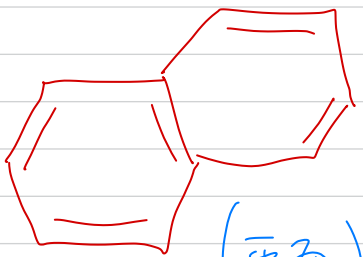
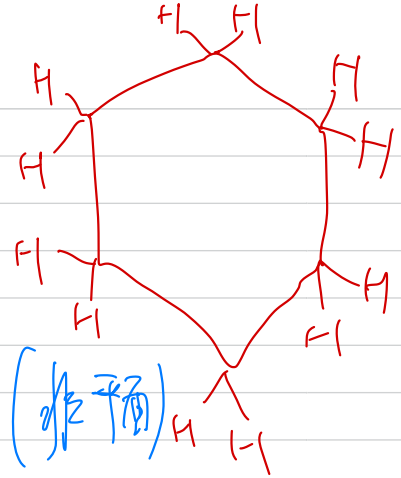
Shape of molecule



(平面)

graphite



(非平面)

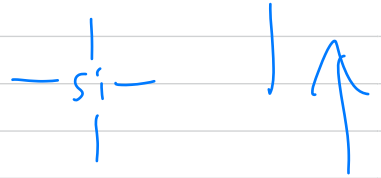
cyclohexane

Carbon 電子有 repulsion，まき数大きい

(single bond)

Why

not



109.5°

平面最大90°

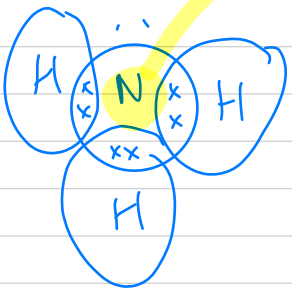
相対小

相対大

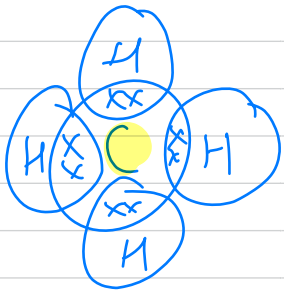
$e^- - e^-$ repulsion

NH_3

central atom



CH_4



central atom

bone pair e^- : 3

lone pair e^- : 1

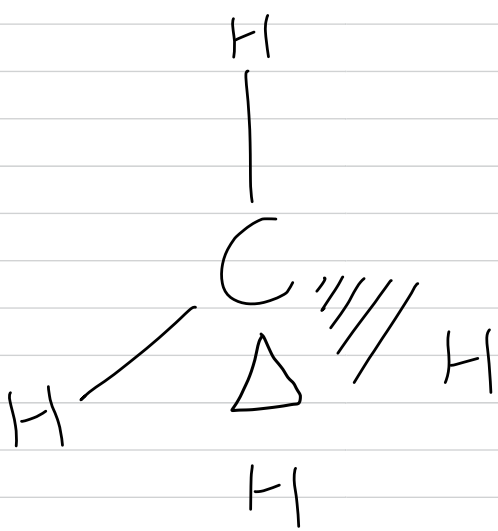
} 4 e^- pair

central atom

bone pair e^- : 4

lone pair e^- : 0

trigonal pyramidal



tetrahedral

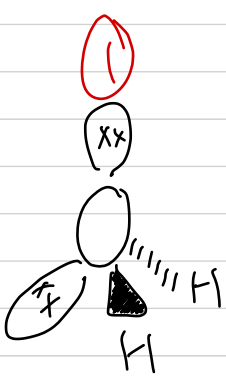
Repulsion : lp - lp > lp - bp > bp - bp

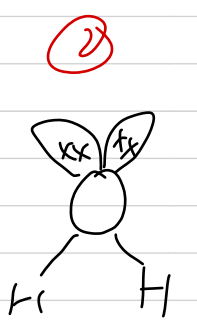
H_2O

Central atom : O

lp : 2

bp : 2





V - shaped

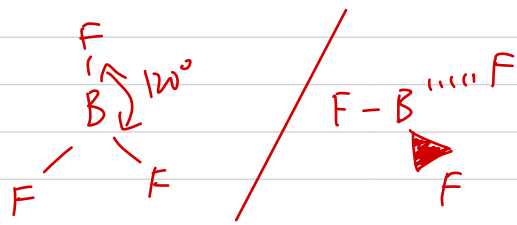
BeH_2

lp: 0
Bp: 2
2

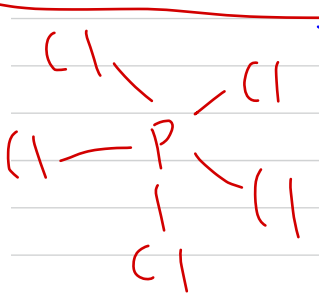
H – Be – H
linear

BF_3

lp: 0
Bp: 3
3



trigonal planar



PCl_3

1+3

PCl_5

10 e^- of P ✓

∴ max: 18 e^-

第三層

NCl_3

X NCl_5 ?

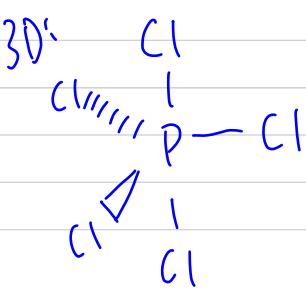
10 e^- on N X

二層

max: 8

5+0

3D:



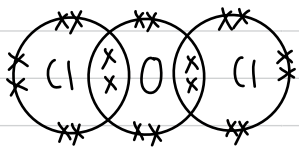
trigonal bipyramidal

a) CO_2 molecular shape:

linear

O = C = O

b) OCl_2 molecular shape:

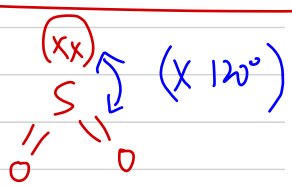


v- shaped

SO_3:

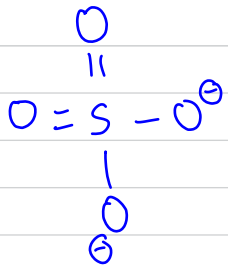
3+0

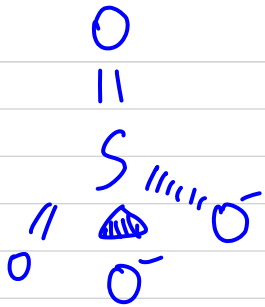
SO_2:



1+2 ∴ 屈 v-shaped

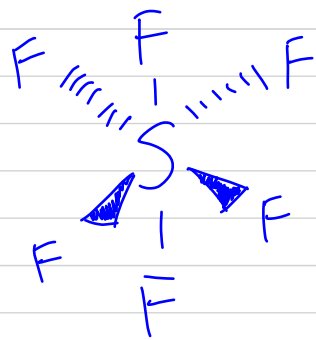
SO_4^{2-}



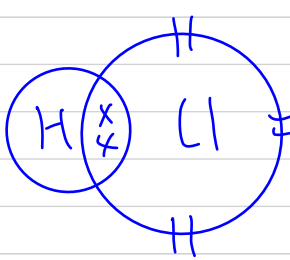


tetrahedral

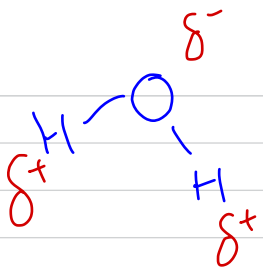
SF_6



octahedral

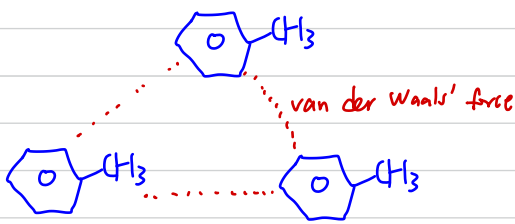


用水把 H atom and Cl atom 分開



∵ 吸引力
∴ 溶 (一起玩, 不分手)

原本 methylbenzene



{ Strength of inter-particles
  comparable?
  - atom
  - ion
  - molecule

[explanation for solubility

I_2 is soluble in hexane. Why?

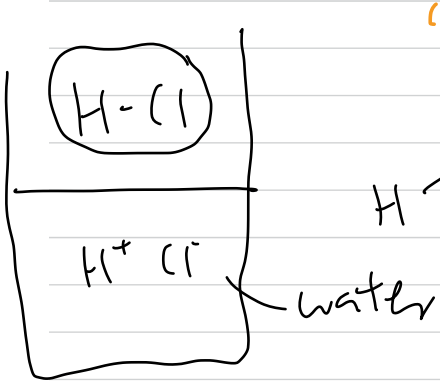
weak vdwf — weak vdwf

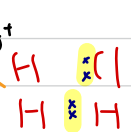
NaCl is insoluble in hexane. Why?

strong ionic bond — weak vdwf

不是給e
covalent bond 斷開，but 產生 polarity

H/Cl 對 bonding electron 的吸引力不同





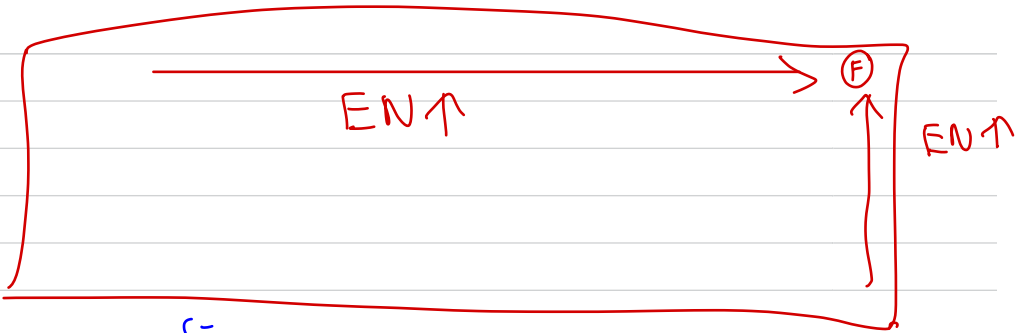
uneven distribution of bonding electron

Electronegativity (EN)

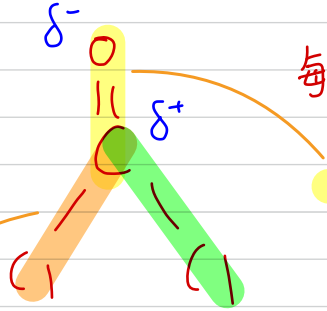
- more electronegative
- less electronegative

↳ ability of an atom to attract bonding e^-

bonding → covalent bond



Is it a polar bond ??



每一支去看 electronegative

∵ Oxygen is more electronegative than C

∴ O=C is a (有 δ^+ δ^-) → polar bond

δ^- δ^+

X real ion

C–Cl is a polar bond

∵ Cl is more electronegative than C.

C – Cl

δ^+ δ^-

F > O > Cl

OCl_2 OF_2

-2 +1 +2 -1

Why the bond is polar : C and Cl have different electronegativity

δ^-

partial negative charge

Is it a polar molecule?

H-Cl ← H-Cl is a polar bond ✓

← H-Cl is a polar molecule ✓

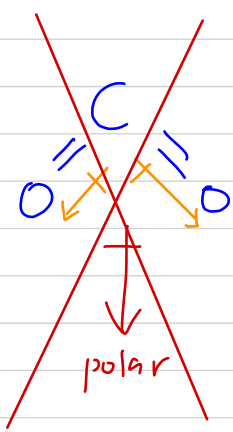
Is CO_2 a polar molecule?

$$\underset{\delta^-}{O} = \underset{\delta^+}{C} = \underset{\delta^-}{O}$$

C 的位置有沒有變

沒變 → cancel

∴ CO_2 is non-polar molecule



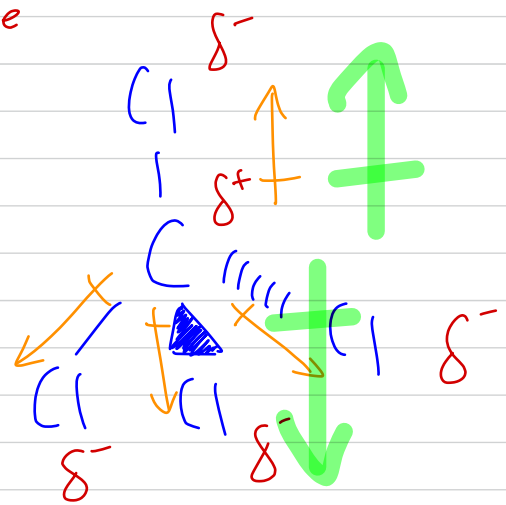
Is water a polar molecule

∴ Water is polar

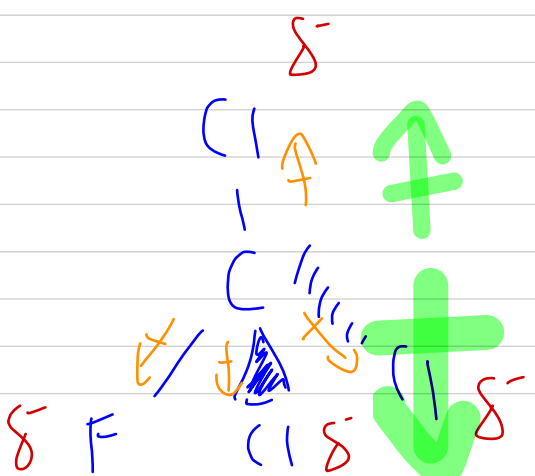
tetrachloromethane

CCl_4

non-polar

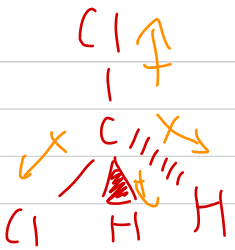


polar



F > Cl

electronegative



can't cancel out bond polarity

Think molecule polarity need think all

bond polarity + shape

Bond polarity cancel out = non polar

X cancel out = polar

CH_4 non-polar

CH_3Cl
CH_2Cl_2
$CHCl_3$
} polar

explanation for non-polar molecule

① Shape The molecule is trigonal planar in shape

② Bond polarity can / can't cancel out each other

③ The three polar / non-polar B-F bonds are / are not arranged symmetrically.