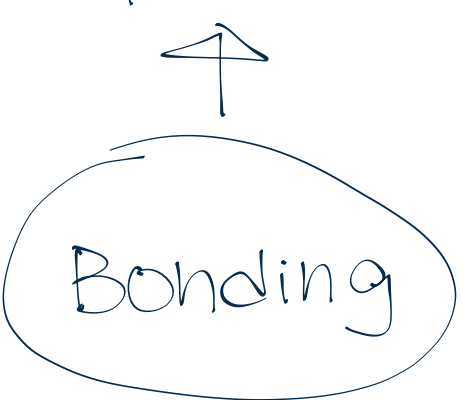
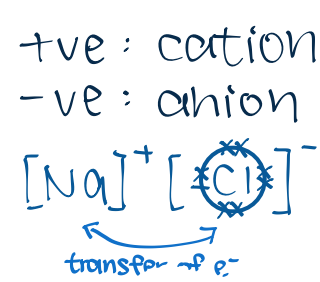


Strong electrostatic force
% positively & negatively
charged species (no partial charge)



ionic bond

Grp I-III w/ Grp IV-VII



non-directional

Giant Ionic Structure

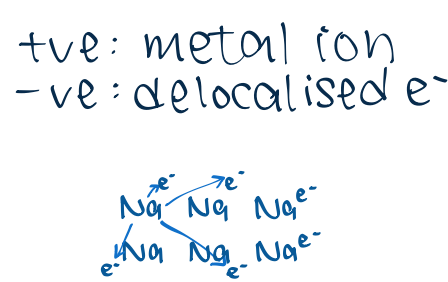
- packed regularly
- ions - ions: strong IB

(strong IB % ions)
- ∇ B.P. / M.P.
- B.P. / M.P. $\propto \frac{\text{charge of ion}}{\text{size of ion}}$

- needs mobile ions
- (aq) / (l): \checkmark
- (s): \times

metallic bond

Grp I-III 自己一个人



non-directional

Giant metallic Structure

- giant lattice of metal ion in a sea of delocalised e^-

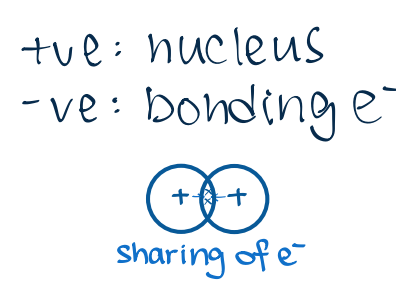
(strong MB % metal ion & delocalised e^-)
- ∇ B.P. / M.P.
- B.P. / M.P. $\propto \frac{\text{no. of delocalised } e^-}{\text{atom size}}$

- delocalised e^-
- (任何 state): \checkmark

- good: delocalised e^-

covalent bond

Grp IV-VII 自然组合



directional

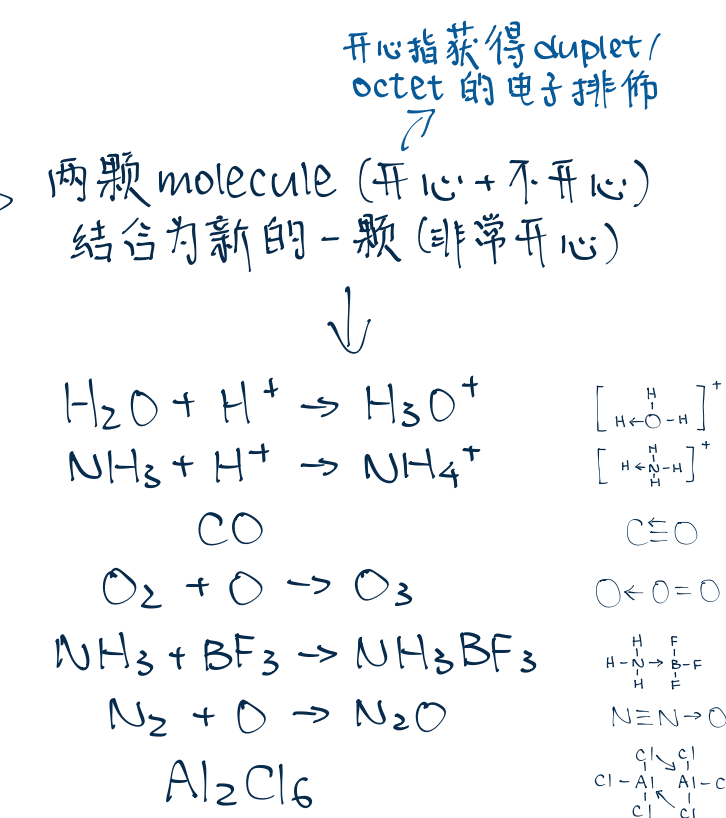
Simple molecular Structure

- simple, discrete molecules
- atoms - atoms: strong CB
- molecules - molecules: weak VDW

(weak VDW force % molecules)
- ∇ B.P. / M.P.
- B.P. / M.P. \propto molecular size

- no mobile ions/delocalised e^- : \times
- electrolytes (eg. HCl, NH_3) ionizes in $H_2O \rightarrow$ mobile ions: \checkmark

- 一颗 atom 提供电子, 两颗 atom 共用
Dative covalent bond



Giant covalent Structure

- \times discrete molecules
- giant network
- atoms - atoms: strong CB

(strong CB % atoms)
- ∇ B.P. / M.P.
- B.P. / M.P. $\propto \frac{1}{\text{atom size}}$

- no mobile ions/delocalised e^- : \times
- except graphite/graphene (delocalised e^-): \checkmark

组合

正/负物质

directional / non-directional

particle arrangement

boiling / melting point

electrical conductivity

thermal conductivity

mobile ion / delocalised e^- conc. $\uparrow \Rightarrow$ conductivity \uparrow

like dissolves like

Solubility

WATER	
Sol.	insol.
X^-	AgX, PbX_2
SO_4^{2-}	$CaSO_4, BaSO_4, PbSO_4$
SO_3^{2-}	$CaSO_3, BaSO_3, PbSO_3$
NO_3^-	
HCO_3^-	
M^+, NH_4^+	
	CO_3^{2-}
	OH^-
\uparrow higher priority	
OIL	
- all insoluble	

WATER
- Soluble if it reacts w/ water (e.g. 钾钠钙[镁])
OIL
- all insoluble

WATER	
Sol.	insol.
polar non-metal oxides (eg. SO_2)	every other covalent compound
acids (eg. HCl)	
organic compounds	
- $\sqrt{OH^-}$	
- $\frac{OH^-}{OH^-} < 4$ (eg. $C_6H_{12}O_6$)	
OIL	
- mostly soluble	

WATER
- all insoluble
OIL
- all insoluble

hardness

- hard
- strong IB restricts movement of ion

ductility, malleability

- brittle

- ductile & malleable

- brittle

Density

- high

- high

- hard except graphite
- strong CB restricts movement of atoms

Naming

ionic compound
<cation> <anion>
Simple ions: -ide suffix

Covalent compound
1. B Si C P N H S I Br Cl O F \rightarrow 先写排序靠前的
2. 第2个 element, + ide suffix
3. + numerical prefix

Examples

