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Octet Rule

Valence electrons

Formation of cations $^{+}$

Formation of anions $^{-}$

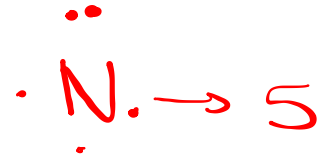
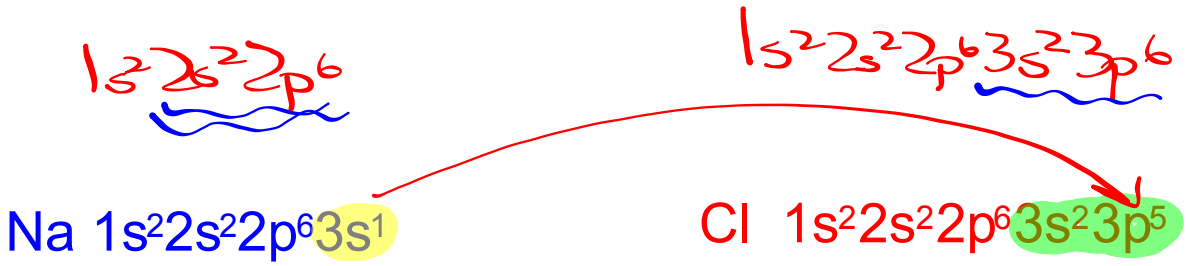


Table 7.1

Electron Dot Structure of Some Group A Elements

Period	Group 1A	2A	3A	4A	5A	6A	7A	8A
1	H·							He:
2	Li·	·Be·	·B·	·C·	·N·	·O·	·F·	:Ne:
3	Na·	·Mg·	·Al·	·Si·	·P·	·S·	·Cl·	:Ar:
4	K·	·Ca·	·Ga·	·Ge·	·As·	·Se·	·Br·	:Kr:



Al $1s^2 2s^2 2p^6 3s^3$

F $1s^2 2s^2 2p^5$

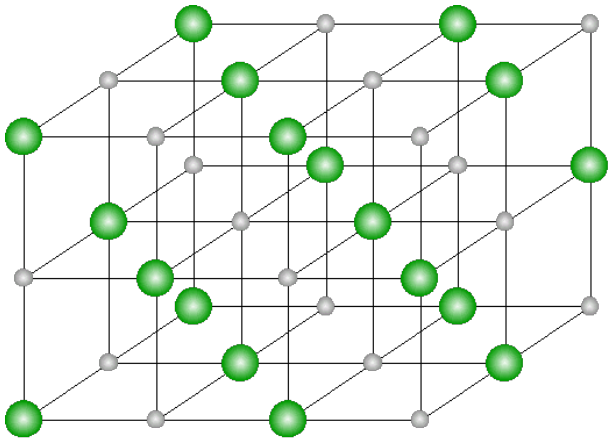
F $1s^2 2s^2 2p^5$

F $1s^2 2s^2 2p^5$

Ne → $1s^2 2s^2 2p^6$

Ar → $1s^2 2s^2 2p^6 3s^2 3p^6$

Crystal Structure of Ionic Solids



Na^+ Cl^-
Cl^- Na^+

$CaCl_2$

Ca^{2+} Cl^- Cl^-

NaCl

Na^+ Cl^- ... Na^+ Cl^-

Cl^- ... Na^+ ... Cl^- ... Na^+

Metallic Bonds

Metals are made of closely packed cations rather than neutral atoms.

In metals, the valence electrons drift freely from one part of the metal to another.

Metallic bonds consist of the free-floating valence electrons for the positively charged metal ions.

Ductility and Malleability

Metals - cations insulated by 'sea' of electrons

- are ductile and malleable

Ionic compounds - positive ions pushed together and repel, causing crystal to shatter.

- are not ductile and malleable

c) N_2H_5 → dinitrogen pentahydroxide

g) H_2CrO_4 aqueous hydrogen chromate

j) Li_3PO_4 —H—

4.5) iron(III)sulfate heptahydrate

Fe^{3+} SO_4^{2-}

$Fe_2(SO_4)_3 \cdot 7H_2O$

$(H_2O)_7$

KF

ionic

transfer

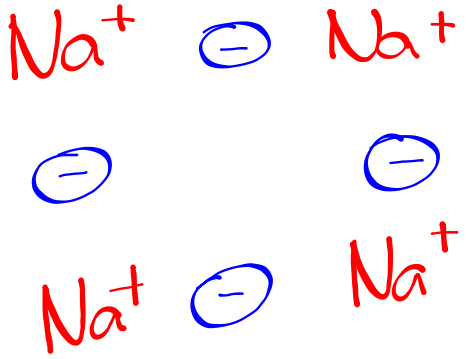
Nat/Cl⁻ attraction

CO_2

molecular

share

covalent



+ = lost e's

metals nonmetals

$Na^+ Cl^-$

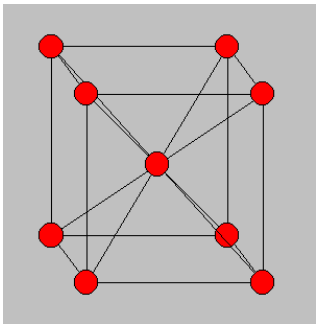
$Cl - Cl$ share

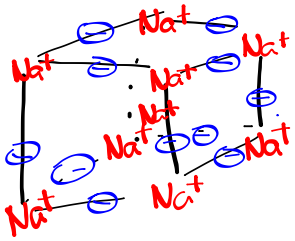
Crystalline Structure of Metals

Metals are arranged in very compact and orderly patterns.

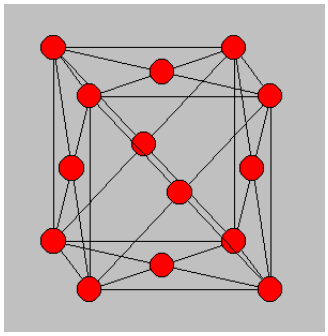
Closely-Packed Arrangements:

- Body-Centered Cubic

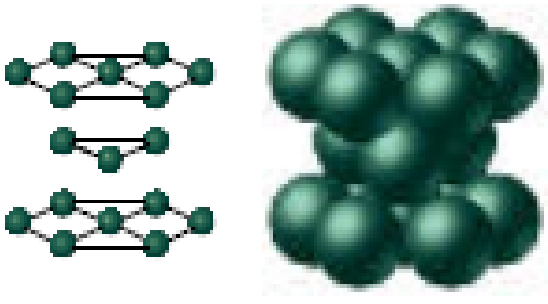




- Face-Centered Cubic



- Hexagonal Close-Packed



Hexagonal close-packed