Chemical Bonding

C $1s^2 2s^2 2p^2$

Valence electrons
electrons in the highest occupied energy level of an element's atoms.

- determines the chemical properties of an element
- only electrons used in chemical bonds
- for a representative element, the number of valence electrons corresponds to the group number

Electron dot structure
diagrams showing the valence electrons as dots

Table 7.1

N

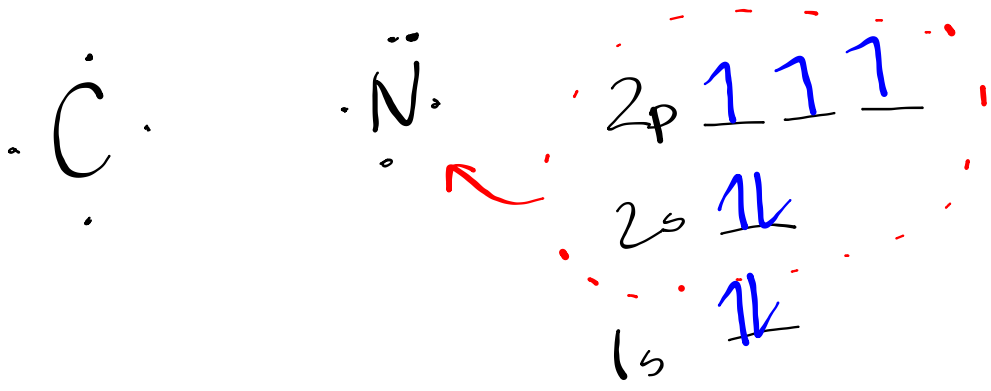

Table 7.1

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:

Ne $1s^2 2s^2 2p^6$

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

Octet Rule

To form compounds, atoms usually achieve the electron configuration of a noble gas.
At the highest occupied energy level: ns^2np^6

Formation of Cations
Cations lose valence electrons to form positively charged ions

$Na\ 1s^2 2s^2 2p^6 3s^1 \xrightarrow{-e^-} Na^+\ 1s^2 2s^2 2p^6$

Ionization:

$Na \longrightarrow Na^+ + e^-$

11 10 1

Transition Metals will attempt to form a pseudo noble-gas configuration.

Cu (I)

Formation of Anions

Anions gain electrons to produce a negatively charged ion.

$Cl\ 1s^2 2s^2 2p^6 3s^2 3p^5 \xrightarrow{+ e^-} Cl^-\ 1s^2 2s^2 2p^6 3s^2 3p^6$

Ionization:

$Cl + e^- \longrightarrow Cl^-$

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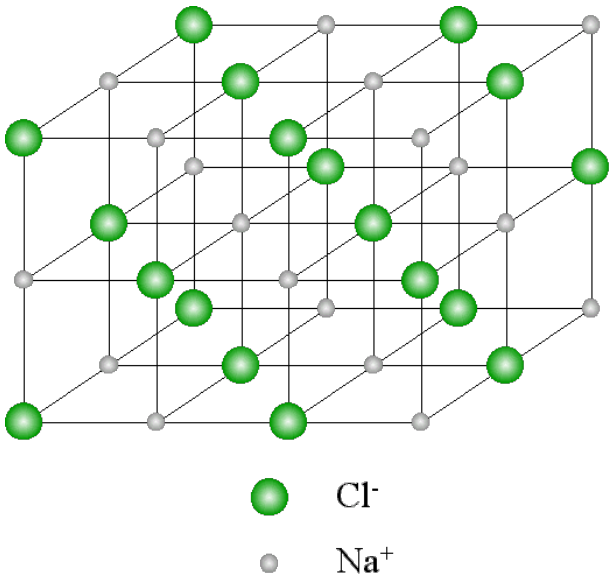
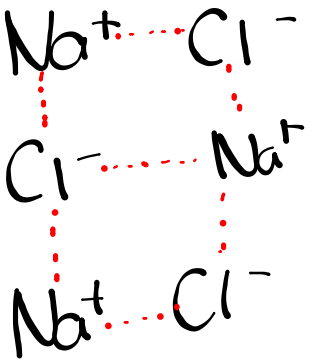
Crystal Structure of Ionic Solids



$NaCl$

Na^+ Cl^-



$CaCl_2$

Ca^{2+} Cl^-

Cl^-

Homework

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