Chemical Bonding

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

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:

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

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

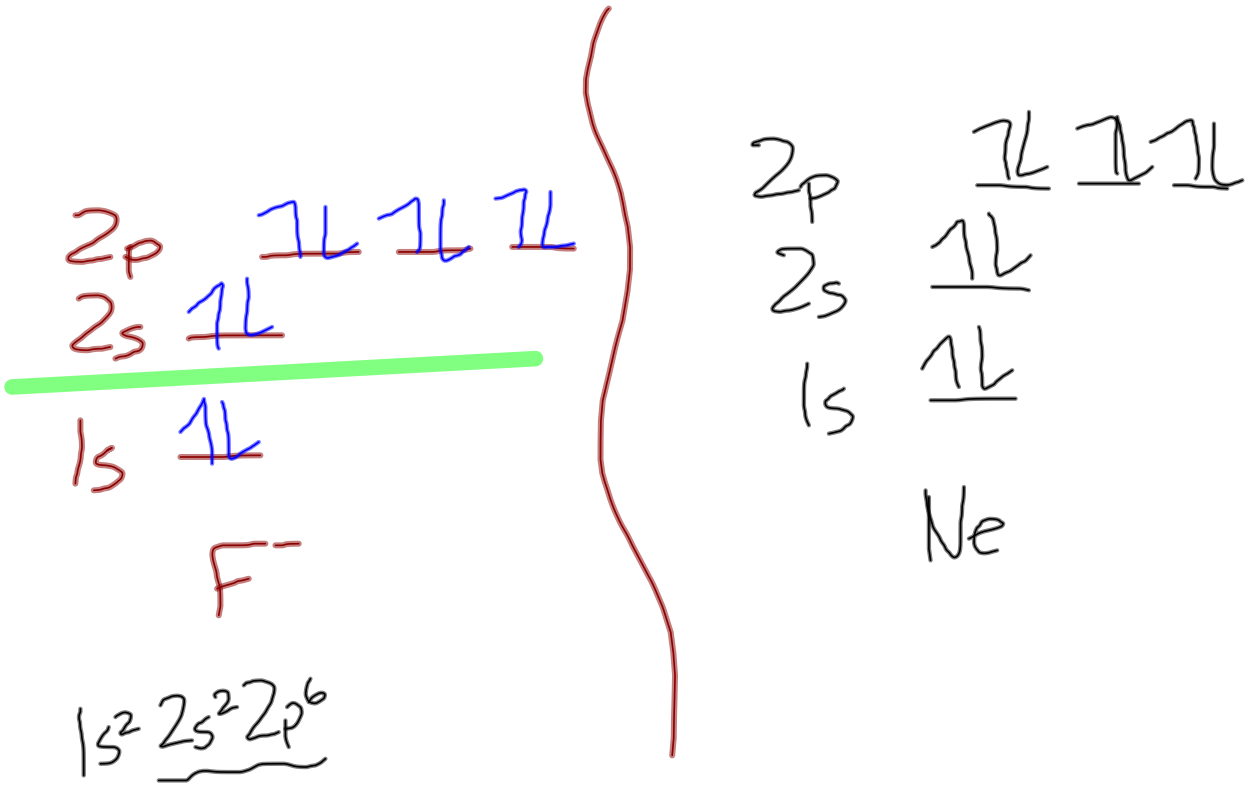
Ionization:

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

$Mg \longrightarrow Mg^{2+} + 2e^-$

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

Cu


2p
2s
1s
F⁻
1s² 2s² 2p⁶
2p
2s
1s
Ne

Formation of Anions

Anions gain electrons to produce a negatively charged ion.

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

$s^2\ p^6$

Ionization:

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

$O + 2e^- \longrightarrow O^{2-}$

$1s^2 2s^2 2p^4$

Homework

p. 193 #3-11