

# GENERAL CHEMISTRY

## STANDARD 3.2

**3.2: Write the electron configuration of various ions**

# WHAT IS AN ION?

- An ion is a positively or negatively charged particle
  - Results from the gain or loss of electrons
  - Cation – positive-charged ion resulting from the loss of electrons
  - Anion – negatively-charged ion resulting from the gain of electrons
  
- Particles ONLY gain or lose valence electrons
  - Valence electron – an electron in the outermost energy level
  - Outermost energy level means highest principle quantum number
  - Valence electrons can only come from the s and p orbitals
  - Maximum of eight total valence electrons

# VALENCE ELECTRON EXAMPLES

How many valence electrons are there in Lithium?

Electron Configuration:  $1s^22s^1$

Note the highest principle quantum number is 2, and there is one electron in this orbital, so Lithium has one valence electron.

How many valence electrons are there in Phosphorus?

Electron Configuration:  $1s^22s^22p^63s^23p^3$

Note the highest principle quantum number is 3, and there are two electrons in the 3s orbital and 3 electrons in the 3p orbital, making a total of five valence electrons for phosphorus.

# ELECTRON CONFIGURATION OF IONS

When finding the electron configuration of an ion, simply add (anion) or subtract (cation) the same number of valence electrons as the ion charge.

Lithium +1 Cation – Results in loss of one electron from 2s orbital  
Electron Configuration:  $1s^2$

Phosphorus -3 Anion – Results in gain of three electrons into 3p orbital

Electron Configuration:  $1s^2 2s^2 2p^6 3s^2 3p^6$