Types of Atoms

A closer look at neutral atoms and ions

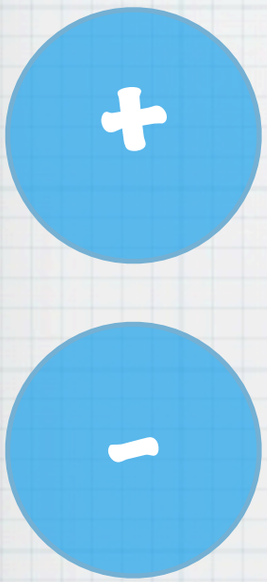
Types of Atoms

* There are various type of atoms
  * **Neutral Atom**: same number of protons and electrons
    * No charge
    * What we have looked at so far

Types of Atoms

* Ion: The number of protons is different from the number of electrons
* Have a charge

Types of Atoms



* Cations (Positive Ion) - and ion that has more protons than electrons.
* Anions (negative ion)- an ion that has more electrons than protons.

Forming Ions

* Stable Octet Rule:
  * Atoms will lose or gain electrons in order to have a full outermost (VALENCE) shell. Contains eight electrons.
  * This makes them stable.

Forming Ions

* Stable Duet Rule:
  * Atoms will gain or lose electrons to have a full outer shell, two electrons.
  * This applies only to . . .

Forming Ions

* Stable Duet Rule:
  * Atoms will gain or lose electrons to have a full outer shell, two electrons.
  * This applies only to hydrogen

Metal Atom vs Metal Ion

Mg Atom

Mg Ion

Metal Atom vs Metal Ion

Mg Atom

Mg Ion

Hint: it is easier to take away 2 electrons instead of adding 6

Metal Atom vs Metal Ion

* Rule: metals lose electrons and have a positive charge equal to the group number.
    * Examples: Lithium, Sodium, Beryllium, Magnesium

Non-metal Atom vs Non-metal Ion

P Atom

P Ion

Non-metal Atom vs Non-metal Ion

P Atom

P Ion

Hint: it is easier to gain 3 electrons
instead of taking away 5

Non-metal Atom vs Non-metal Ion

* Rule: non-metals gain electrons and have a negative charge equal to eighteen minus the group number.
  * Example: Phosphorous is group 15. 18-5=3. Therefore phosphorous has a charge of -3.
    * Examples: Flourine, oxygen, nitrogen

A few anomalies. . .

* Noble gases (Group 18) already have a full outer shell, so they have no charge.
* Hydrogen is a non-metal but still forms a positive ion. It is the exception to the rule.

Practice Practice

* Practice drawing the following ions and write the charge
  * Boron, Aluminum, Potassium, Sulphur

Writing Ions

* When Potassium loses an electron, it becomes positive by one and should be written like this K^{1+} or K^{+}
* When sulphur gains two electrons, it becomes negative by two and is to be written like this S^{2-}

Overview

- Metal ions with have a positive charge (cations)
  - Na^{+}, Mg^{2+}, Be^{2+}, K^{+}, Ca^{2+}, Li^{+}
- Non-metals will have a negative charge (anions)
  - O^{2-}, Cl^{-}, I^{-}, F^{-}, S^{2-}, N^{3-}, P^{3-}