Why do Elements Combine?

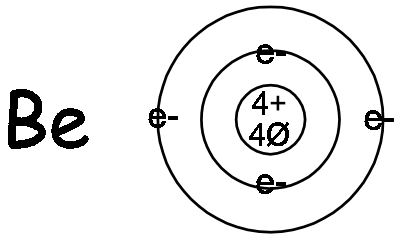
- **Elements seek a stable outer energy level**
  - ⇒ **Full or 8 electrons**
- **Elements can borrow or share electrons**
  - ⇒ **Metals tend to lend electrons**
  - ⇒ **Non-metals tend to borrow**
- **The number of electrons an element is likely to lend or borrow is known as its valence**

A Review...

- **Charges of particles in an atom:**
  - ⇒ **proton: positive (+)**
  - ⇒ **neutron: neutral/no charge (0)**
  - ⇒ **electron: negative (-)**
- **opposite charges attract**
- **like charges repel**
  - ⇒ **electrons are held in place around the nucleus by attraction**
  - ⇒ **charge of whole atom is neutral because**
    - ◊ **numbers of protons and electrons are equal**
    - ◊ **positive and negative charges cancel each other out**

Connection to VALENCE

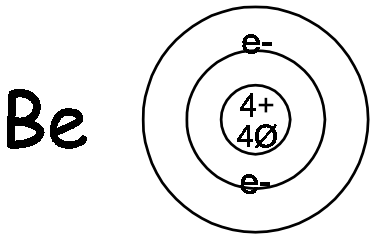
- **What happens to the balance between + and - when an element lends or borrows electrons??**
- **The element develops a positive (lends) or negative (gains) charge**



electrically neutral

+4 -4

0



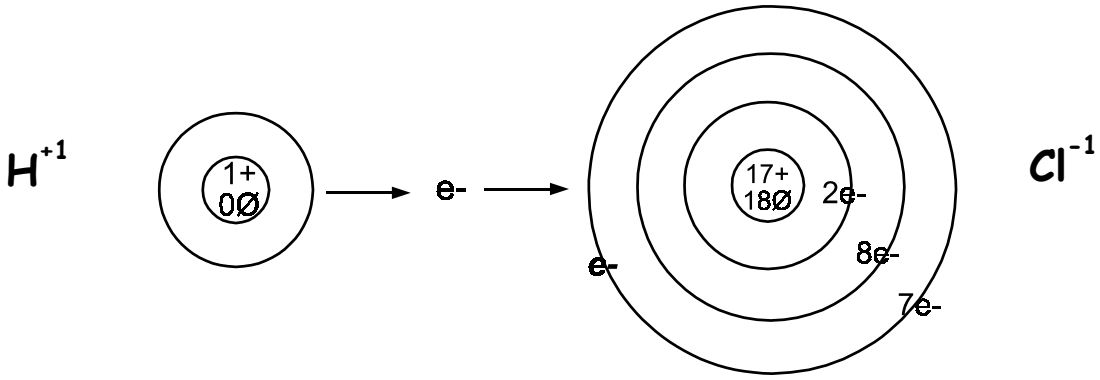
electrically charged

+4 -2

+2

Be^{++} or Be^{2+}

- **Ion- an electrically charged particle formed by the transfer of electrons (+ or - charge)**
- **The charge of an ion is related to its valence number**
  - ⇒ **Elements in Groups 1A, 2A, 3A form positive ions (+1, +2, +3)**
  - ⇒ **Elements in Groups 5A, 6A, 7A form negative ions (-3, -2, -1)**
- **Bonds that form between ions are called ionic bonds**
- **Result from a transfer of electrons**

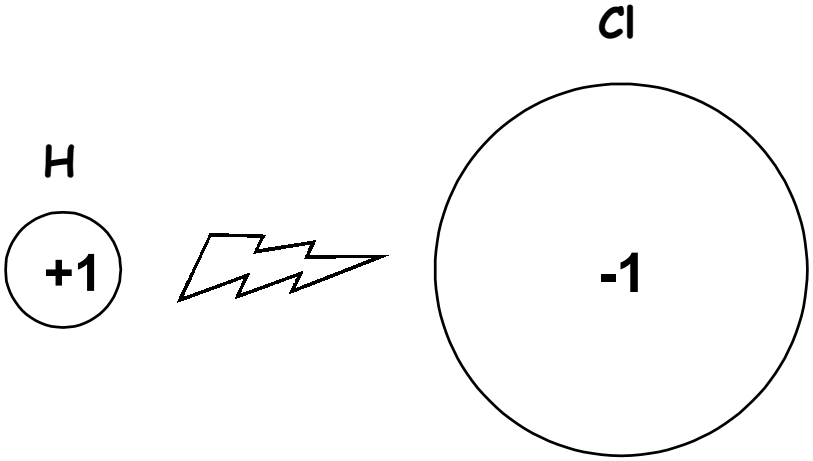


+1 charge
(1 proton, 0 electrons)

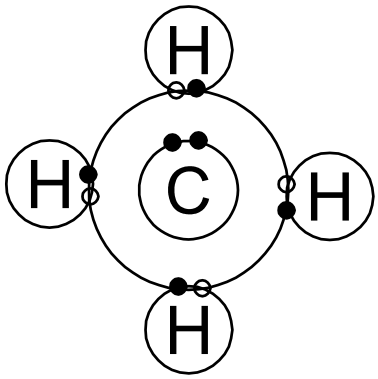
-1 charge
(17 protons, 18 electrons)

Opposite charges attract so...

- **Hydrogen is held together with Chlorine by "attractive" forces**
  - ⇒ **called an ionic bond**



- **Other elements (such as carbon) form covalent compounds**
- **formed by the sharing of electrons**
  - ⇒ **Each outer energy level is stable**



- **Called molecules**
- **Covalent compound CH_4 (methane)**