

## Electron Arrangements

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- Electrons constantly move around the nucleus in different energy levels (shells)
- The further from the nucleus an electron is the more energy it has
- The maximum number of electrons in each shell varies
  - Shell 1: 2
  - Shell 2: 8
  - Shell 3: 8
  - Shell 4: 2 (2 go into shell 4 before filling shell 3 up to 18 electrons)

e.g. Sodium (Na) = 2,8,1

Calcium (Ca) = 2,8,8,2

## Gaining/Losing Electrons

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- **Cations** are positively charged ions formed when a **metal** atom **loses** an electron(s)  
e.g. Sodium ion  $\text{Na}^+$  electron configuration 2,8
- **Anions** are negatively charged ions formed when a **non-metal** atom **gains** an electron(s)  
e.g. Oxide  $\text{O}^{2-}$  electron configuration 2,8
- **Isoelectronic:** 2 different atoms or ions having the same electron configuration  
e.g. Potassium ion ( $\text{K}^+$ ) 2,8,8  
Argon (Ar) 2,8,8
- **Valence electrons** are electrons in the outermost shell that have the highest energy and are available for bonding
- Reactivity of atoms can be explained by their electron arrangement
  - An atom with a full valence shell is stable.
  - Group 18 elements are stable and unreactive because they have a full valence shell
  - Atoms are stable when they have **8 electrons** in their outer shell (except hydrogen - stable with 2).
    - This is called the OCTET rule (Oct = 8)
- Obtaining the 8 electrons is done in 2 ways
  - **Sharing** electrons to form **covalent** bonds
  - **Transferring** electrons to form **ionic** bonds