Chapter 2 – Atoms

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- Dalton's Atomic Theory:
  1. Elements are made of atoms
  2. All atoms of the same element are the same
  3. Different atoms from different elements are different
  4. Certain atoms can combine
  5. No creation or destructing of atoms (conservation of mass)
- Constant Composition – All compounds have the same composition (Water is always H_2O)
- Multiple Proportions – Compounds come together in whole numbers (Always H_2O, never $H_{.5}O$)
- JJ Thompson – Used cathode ray to determine that atoms have tiny negative particles, but, because atoms are neutral, there must be positive charges to counter the negative
- Ernst Rutherford – The gold foil experiment shot alpha particles at source of atoms
  1. Most went through the atoms
  2. A few large deflections

  He concluded...

  3. Atoms are mostly open space
  4. Center has positive charge
- Modern concept of atom – Protons and neutrons in nucleus. Electrons on outside
- Different chemical properties are from the number and arrangement of the electrons
- Periodic Table:

1. Columns up and down, rows left to right
2. Column 1 − Alkali Metals
3. Column 2 − Alkaline Earth Metals
4. Middle − Transition Metals
5. Column 7 − Halogens
6. Column 8 − Noble Gases

- Properties of Metals
  1. Conduct
  2. Malleable
  3. Ductile
  4. Lustrous
- Atomic Number − Number of protons, usually displayed at the top
- Mass Number − Protons plus neutrons is the atomic mass
- Isotopes − Different number of neutrons
- Ions − Different number of electrons
  1. Cations − Positive
  2. Anions − Negative
- Polyatomics − Charged Groups
- Ionic Compounds (Examples):
  1. Mg^{+2} & $Cl^{-} \Rightarrow MgCl_2$
  2. Ca^{+2} & $PO_4 \Rightarrow Ca_3(PO_4)_2$
  3. Cr^{+3} & $OH^{-} \Rightarrow Cr(OH)_3$
- Common Charges:
  1. Aluminum $\Rightarrow Al^{+3}$
  2. Zinc $\Rightarrow Zn^{+2}$
  3. Silver $\Rightarrow Ag^{+1}$