Nuclear Chemistry Notes

- Chemical reactions involve atoms gaining or losing **electrons**
- Nuclear reactions involve atoms gaining or losing **protons or neutrons**
- Remember that protons and neutrons are found in the nucleus of the atom
- Marie Curie was a French scientist who studied Uranium
  - Uranium gave off a strange type of energy that she called “Radiation”
- **Radiation** is caused by a part of the nucleus being shot out of the nucleus of the atom into space
- Radiation tends to happen at an even rate that scientists can measure and call the **half-life**
  - A half-life is the amount of time needed for half of the atoms in a sample to release their radiation and turn into a different element
- There are 3 main types of radiation that are caused by different particles
  - Alpha Particles
    - Atom loses 2 protons and 2 neutrons
    - Can be stoped by a sheet of paper
    - Cannot damage your cells
  - Beta Particles
    - Neutron breaks apart to become a proton
    - Will pass through skin, but are stopped by muscle or bone
    - Can damage your cells
  - Gamma Particles
    - Very high energy
    - Pass through the body
    - Causes severe damage to cells
- When radiation is released, the number of protons change and the atoms have a new identity
  - Alpha particles-Atomic number and mass are reduced by 2
  - Beta particles-Atomic number is increased by 1, mass stays the same
- Atoms can have different numbers of neutrons and be the same element
  - An **Isotope** is an atom that has a different number of neutrons than “normal” for the element
  - Some atoms that are not radioactive, like Carbon do have radioactive isotopes
  - We can use the half-life of Carbon 14 to determine how old certain objects are