Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

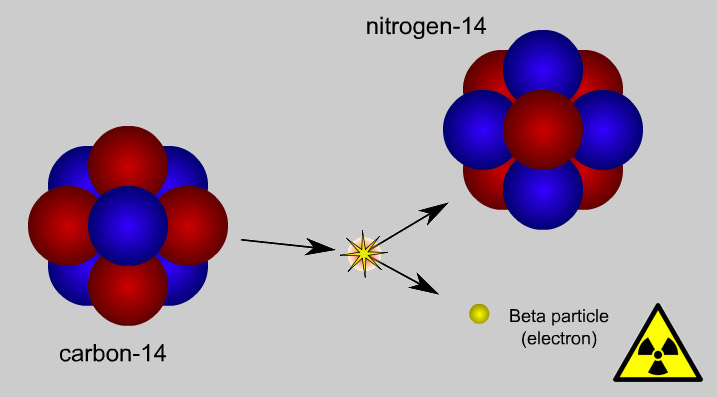
**Chapter 10 Notes: Nuclear Chemistry**

1. **Radioactivity**: the process in which an unstable atomic nucleus emits charged particles of energy.

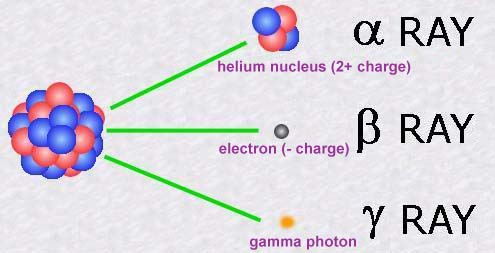
Draw atom:

Draw radioisotope (unstable):

* 1. The atoms of one element can change into atoms of a different element.
     1. **Example**: Uranium will decay into 13 different elements until it becomes stable lead
     2. **Example:** Carbon-14 decays into Nitrogen

****

* 1. **Types of decays**:
     1. ***Alpha*** : Positive particle -two protons and two neutrons (Helium atom)
     2. ***Beta***: an electron
     3. ***Gamma***: a ray of penetrating energy



* 1. The particles and energy can break bonds in DNA.
     1. What does this mean for humans? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

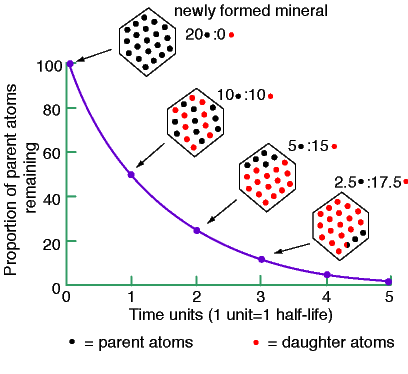
* 1. It can be detected with Geiger counters or film badges.

1. **Half-life:** the time required for one half of a sample of a radioisotope to decay.

*If you 100 particles and* ***half-life is 10 years****, figure out the amount of particles after each half-life:*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Half-Life=0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 100 particles |  |  |  |  |  |  |

How many times can you cut a piece of paper in ½ ? \_\_\_\_\_\_



* 1. Rates are constant
  2. Carbon-14 is used to determine the age of an object.

1. **Strong Nuclear Force:** The force that holds neutrons and protons together in the nucleus.
   1. In unstable nuclei, the larger the nucleus the more unstable the isotope.
   2. When the strong nuclear force is overcome by the repulsive electric force, the isotope becomes unstable.
   3. All elements with more than 83 protons are unstable.
2. **Nuclear Fission**: the splitting of an atomic nucleus into two smaller parts.
   1. Produces a tremendous amount of energy
   2. Mass is converted into Energy
      1. Used in nuclear power plants & atomic bomb
      2. E = MC2
   3. **Chain Reactions**: when neutrons released during the first initial nucleus trigger a series of nuclear fissions.
      1. Used to make nuclear bomb and generate power plants
3. **Nuclear Fusion**: nuclei of two atoms combine to form a larger nucleus
   1. Produces energy
   2. The sun is powered by fusion of Hydrogen into Helium
   3. Hydrogen bomb

**FUSION FISSION**

**H.1.P1-State Standard: Explain how the composition of the nucleus is related to isotopes and radioactivity.**