

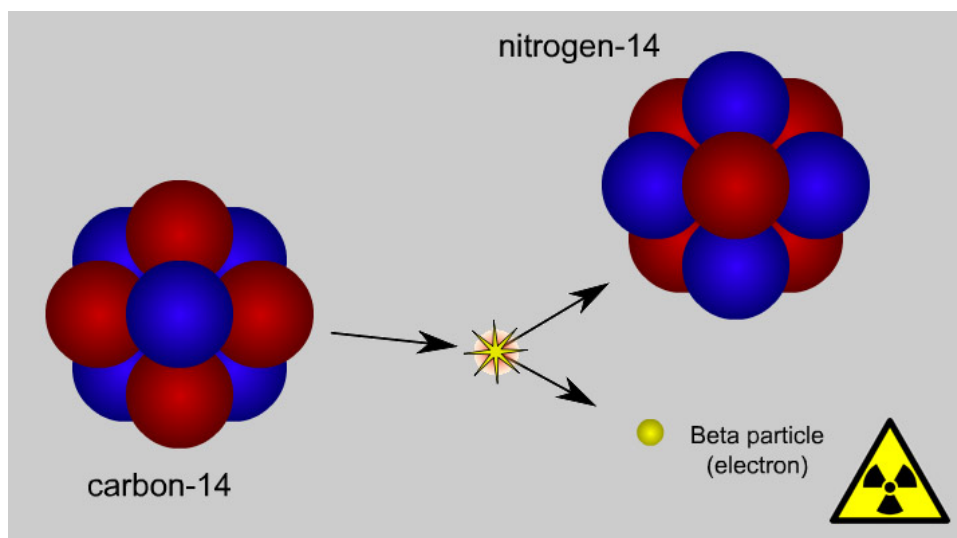
Name _____

Chapter 10 Notes: Nuclear Chemistry

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

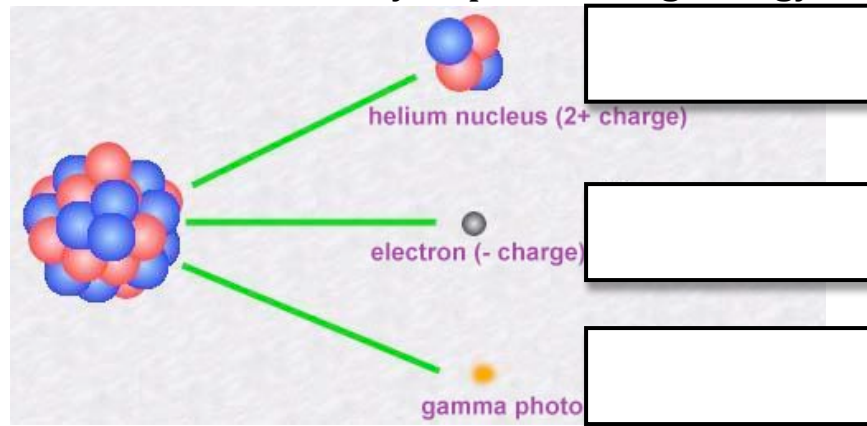
Draw atom:	Draw radioisotope (unstable):
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- a. The atoms of one element can change into atoms of a different element.
 - i. **Example**: Uranium will decay into 13 different elements until it becomes stable lead
 - ii. **Example**: Carbon-14 decays into Nitrogen



b. **Types of decays:**

- i. **Alpha** : Positive particle -two protons and two neutrons (Helium atom)
- ii. **Beta**: an electron
- iii. **Gamma**: a ray of penetrating energy



c. The particles and energy can break bonds in DNA.

- i. What does this mean for humans? _____

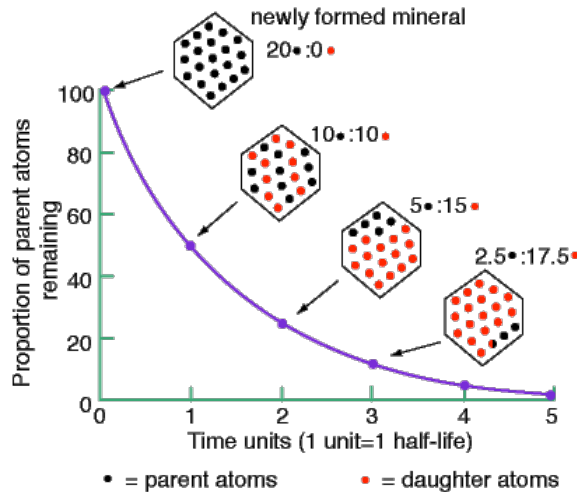
d. It can be detected with Geiger counters or film badges.

2. **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:*

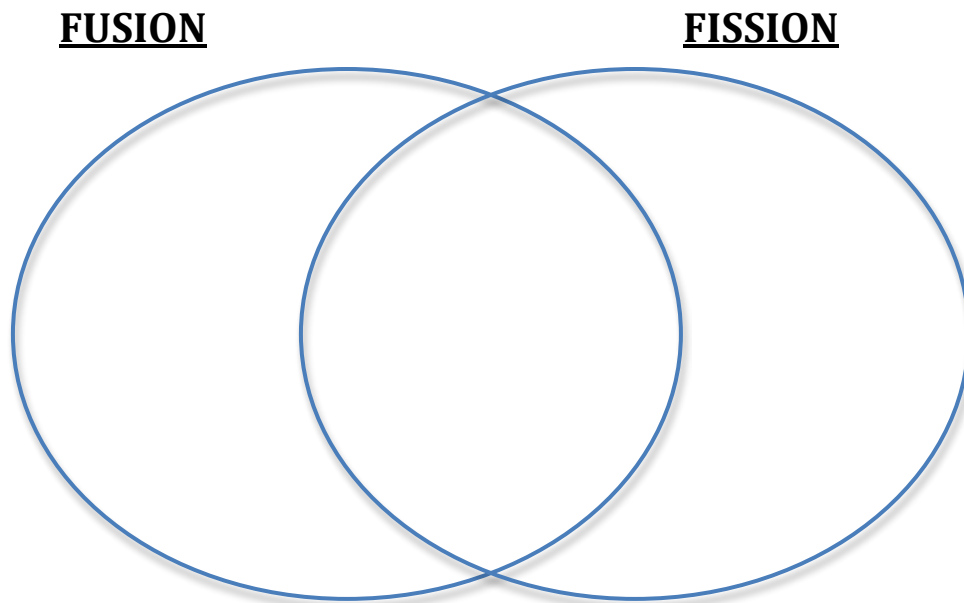
Half-Life=0	1	2	3	4	5	6
100 particles						

How many times can you cut a piece of paper in $\frac{1}{2}$? _____



- a. Rates are constant
- b. Carbon-14 is used to determine the age of an object.
3. **Strong Nuclear Force:** The force that holds neutrons and protons together in the nucleus.
 - a. In unstable nuclei, the larger the nucleus the more unstable the isotope.
 - b. When the strong nuclear force is overcome by the repulsive electric force, the isotope becomes unstable.
 - c. All elements with more than 83 protons are unstable.
4. **Nuclear Fission:** the splitting of an atomic nucleus into two smaller parts.
 - a. Produces a tremendous amount of energy
 - b. Mass is converted into Energy
 - i. Used in nuclear power plants & atomic bomb
 - ii. $E = MC^2$
- c. **Chain Reactions:** when neutrons released during the first initial nucleus trigger a series of nuclear fissions.
 - i. Used to make nuclear bomb and generate power plants

5. **Nuclear Fusion**: nuclei of two atoms combine to form a larger nucleus
- Produces energy
 - The sun is powered by fusion of Hydrogen into Helium
 - Hydrogen bomb



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