Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**Radioactive Decay Practice Worksheet**

**A mmon Types of Radioactive Decayh the mass of a sample of copper-66 decrease in 51 mintues? The half-life of copper-66 is 5.10 1. Alpha Decay**

 Can be described by:

* The nucleus of an atom splits into two parts
* The alpha particle is emitted from the nucleus
* The nucleus that is left behind now has an atomic number reduced by 2 and its mass number reduced by 4. (2 protons and 2 neutrons were emitted
* Write the symbol for an alpha particle using isotopic notation in the space to the right. 🡪

Here is a typical alpha decay equation: Fill in the blank space. $$

- Alpha radiation can be blocked by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Beta Decay**

 Can be described by:

* The emission of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Write the symbol for the particle here 🡪
* The atomic number goes up by one and the mass number remains unchanged.
* A neutron inside the nucleus of an atom breaks down into a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is emitted.

Here is a typical beta decay equation: Fill in the blank space. $$

\*\* Beta particles have less charge than alpha particles and much less mass. Consequently, beta particles are more penetrating! While they cannot be stopped by a piece of paper they can be stopped by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3. Gamma Radiation**

Can be described by:

* The emission of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ only.
* **Gamma ray**- a high energy photon emitted by a radioisotope; nuclei can emit gamma rays by themselves, or the emission of energy can accompany the emission of an alpha or beta particle.
* Can the emission of a gamma ray change the atomic number or mass number of an element?
* Write the symbol for gamma radiation here 🡪

\*\* Gamma rays are extremely high energy and

can be very dangerous!

***NOTE:*** *The terms alpha, beta, and gamma radiation may also appear as alpha, beta, and gamma decay.*

**Additional Nuclear Reactions** *You will also be responsible for knowing the following nuclear reactions.*

**4. Positron Decay**

Positron decay is the mirror image of beta decay and can be described by:

* The emission of a positron (a particle with the mass of an electron but a positive charge).
* Something inside the nucleus breaking down causing a proton to become a neutron.
* The atomic number goes down by one and the mass number remains unchanged.
* The symbol for a positron is: $$

Here is a typical positron decay equation: $$

**Practice**

**Part I: Classify each of the following nuclear reactions by particle and type of radiation (decay or capture). *e.g. alpha decay***

1. $\rightarrow +$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. $\rightarrow +$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. $\rightarrow +$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. $ \rightarrow γ+$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part II: Complete the nuclear reaction equations below. Then classify them by particle and type (decay or capture).**

1. $ \rightarrow + \\_\\_\\_\\_\\_\\_\\_$ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. $ \rightarrow \\_\\_\\_\\_\\_\\_\\_+ $ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. $\rightarrow + \\_\\_\\_\\_\\_\\_\\_$ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. $ \rightarrow \\_\\_\\_\\_\\_\\_\\_+$ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. $\rightarrow \\_\\_\\_\\_\\_\\_\\_+ $ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

alpha and gamma decay

1. $\rightarrow \\_\\_\\_\\_\\_\\_\\_+ \\_\\_\\_\\_\\_\\_+ \\_\\_\\_\\_\\_\\_\\_ $ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. $\rightarrow \\_\\_\\_\\_\\_\\_+$ classify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part III:**

1. Write the nuclear equation for the release of a beta particle by lead-210.
2. Write the nuclear equation for the positron decay by thorium-232.
3. Write the nuclear equation for the gamma decay of cerium-144.