Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**What is radioactivity?**

Use your textbook to help you fill in the blanks.

1. Atoms of one element all have the same number of protons but can differ in the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ they contain.
2. Atoms of the same element that have different numbers of neutrons are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Some isotopes are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, because the atoms have too much \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Unstable atoms give off invisible \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or particles to get rid of excess \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. When an element gives off radiation, it changes, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, into a different chemical element.
6. The time takes for half a sample of a radioactive element to decay is its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. The form of radiation made of two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and two neutrons is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. Fast, light electrons that are able to penetrate some materials are a form of radiation called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
9. One form of radiation, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, is not made of particles but of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ waves.

**What are two types of nuclear energy?**

1. During nuclear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a nucleus is split into two or more nuclei with separate neutrons and releases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. During nuclear fission, a single neutron can start a continuing process called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, nuclei of light atoms combine to form one larger nucleus with greater mass.
4. During nuclear-fusion reactions, some of the mass of the merging particles is converted into a large amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**How is radioactivity used?**

1. Radiation can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or find, and treat diseases.
2. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, nuclear fission is used to heat water and to produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Fill in the blanks:**

|  |  |  |  |
| --- | --- | --- | --- |
| beta particles | gamma rays | isotopes | nuclear fusion |
| chain reaction | half-life | nuclear fission | radioactive |

1. Atoms with the same number of protons but different numbers of neutrons are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. The form of radiation that is made of electromagnetic waves rather than particles is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. The splitting of a nucleus into two or more pieces when struck with a slow-moving neutron is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. An element that gives off energy in the form of rays or particles is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. The form of radiation that is made of fast, light electrons, with can penetrate some materials, is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. The amount of time it takes for half of the isotopes in a sample of an element to decay by emitting radiation is the element’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. A reaction in which the products are what keep the reaction going is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. A reaction in which nuclei of light atoms merge to form one nucleus with a greater mass and energy is released is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.