

## Chapter 10 Study Guide

### True or False

- \_\_\_\_\_ 1. Radiocarbon dating is highly accurate in dating objects that are more than 50,000 years
- \_\_\_\_\_ 2. Plants and animals continue to absorb carbon from the atmosphere after they die.

**Completion** - Complete each statement on the line provided. Use the words bank provided *Not all words are used.*

Geiger Counter	Beryllium	Carbon	Nucleus	
Radiation Badge	Radioisotope	Alpha	Gamma	Beta

3. You want to be shielded from all three types of nuclear radiation. If you find shielding that blocks \_\_\_\_\_ radiation, then it will most likely also block the other two types.
4. Francium has 36 isotopes, but only francium-223 occurs in nature. Francium-223 spontaneously emits particles and energy, so francium-223 is a(an) \_\_\_\_\_ of francium.
5. Although the fusion of hydrogen to produce helium is the most common fusion reaction occurring in the sun, several other fusion reactions occur. In one of these, two helium-4 nuclei fuse to form one unstable \_\_\_\_\_ nucleus.
6. Name two devices that are used to detect nuclear radiation.  
a. \_\_\_\_\_ b. \_\_\_\_\_
7. Nuclear radiation is charged particles and energy that are emitted from the unstable \_\_\_\_\_ of radioisotopes.

### Multiple Choice

Write the letter that best answers the question or completes the statement on the line provided.

- \_\_\_\_\_ 8. Carbon-14 forms nitrogen-14 by
- a. alpha decay.                      b. beta decay.  
c. gamma decay.                      d. none of the above

- \_\_\_\_\_ 9. Uranium-238 undergoes nuclear decay. Therefore, uranium-238 will
- remain stable.
  - change into a different element altogether.
  - emit neutral particles and no energy.
  - none of the above
- \_\_\_\_\_ 10. Which of the following is NOT an example of a transmutation?
- Uranium-238 emits an alpha particle and forms thorium-234.
  - Uranium-238 is bombarded with a neutron to produce uranium-239.
  - Potassium-38 emits a beta particle and forms argon-38.
  - Plutonium-239 is bombarded with two neutrons to produce americium-241 and a beta particle.
- \_\_\_\_\_ 11. The half-life hydrogen-3, is about 12 years. After about 36 years, how much of a sample of hydrogen-3 will be left?
- a. 1/8      b. 1/4      c. 1/3      d. 1/2
- \_\_\_\_\_ 12. In general, the nucleus of a small atom is stable. Therefore, over very short distances, such as those in a small nucleus,
- the strong nuclear force is much greater than the electric force.
  - the electric force is much greater than the strong nuclear force.
  - the strong nuclear force equals the electric force.
  - the strong nuclear force and the electric force are both attractive.
- \_\_\_\_\_ 13. Circle the letter that identify which groups of particles make up an alpha particle.
- a. four protons                      b. two protons and two neutrons  
c. two electrons                      d. four neutrons
- \_\_\_\_\_ 14. Which of the following is NOT an advantage of using a fusion reaction instead of a fission reaction to produce energy?
- Workers are not in as much danger from radiation.
  - Hydrogen is used, and hydrogen is easily obtained from water.
  - No harmful waste products are produced.
  - Fusion reactors require less energy than fission reactors do.
- \_\_\_\_\_ 15. Circle the letter that identify the event that takes place during beta decay.
- A proton decomposes into a neutron and an electron.
  - A neutron decomposes into a proton and an electron.
  - An proton is emitted from the nucleus.
  - A neutron is emitted from the nucleus.

\_\_\_\_\_ 16. Circle the letter that describes a sample of a radioisotope after two half-lives.

- a. One eighth of the original sample is unchanged.
- b. One quarter of the original sample is unchanged.
- c. Half of the original sample is unchanged.
- d. Three quarters of the original sample is unchanged.

Use the following table to answer questions 17

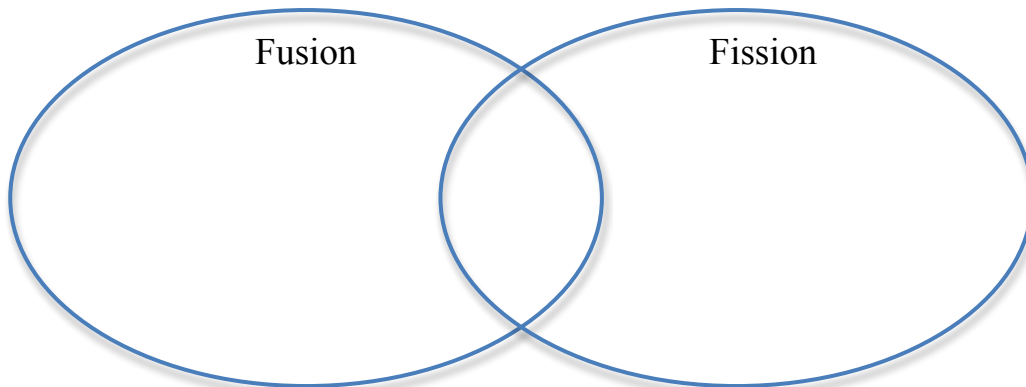
Half-Lives of Selected Radioisotopes	
Isotope	Half-life
Radon-222	3.82 days
Iodine-131	8.07 days
Thorium-234	24.1 days
Radium-226	1620 years
Carbon-14	5730 years

\_\_\_\_\_ 17. Which letter that identifies which sample would be the most unchanged after 100 years.

- a. iodine-131
- b. radium-226
- c. radon-222
- c. thorium-234

**18. Fill in the Venn diagram to compare and contrast fusion and fission with the number that corresponds to the following words**

- 1. Plasma
- 2. Splitting
- 3. Combining
- 4. Nuclear Power Plants
- 5. Sun
- 6. Chain Reaction
- 7. Produce massive amounts of energy



## Essay

19. Describe what happens during a meltdown.

20 . Use the equation  $E = mc^2$  to explain why large amounts of energy are produced by very small amounts of mass during nuclear fission.

21. After 15 minutes, 30 g of a sample of polonium-218 remain unchanged. If the original sample had a mass of 960 g, what is the half-life of polonium-218?