**Chapter 7 Practice Test**  Name \_\_\_\_\_\_\_\_\_\_\_\_\_

/29

**True or False?** Write **T** for true, or **F** for false.

1. \_\_\_\_ An atom’s atomic number can never be greater than its mass number.
2. \_\_\_\_Different isotopes of a particular element have the same mass number but different atomic numbers.
3. \_\_\_\_The only type of radioactive decay that will produce daughter nuclei with different mass numbers is alpha decay.
4. \_\_\_\_Because alpha particles are the biggest, heaviest, and most highly charged of the three common types of radiation emitted during radioactive decay, they are also the most penetrating.

**Matching**

*Match each description regarding the amount of daughter and parent nuclei present to the correct parent isotope and half-life. Each description may be used only once.*

a. After 11 460 years, 25 percent of the parent isotope remains.

b. After nearly one month, approximately 87.5 percent of the parent isotope has decayed.

c. Three times as much daughter isotope exists as parent isotope after 1.4 billion years.

d. After 650 million years, approximately 25 percent of the parent isotope has decayed.

e. Approximately 3 percent of the parent isotope remains after 140 years.

1. \_\_\_\_\_ uranium-235 / 710 million years
2. \_\_\_\_\_ strontium-90 / 28 years
3. \_\_\_\_\_ potassium-40 / 1.3 billion years
4. \_\_\_\_\_ carbon-14 / 5730 years
5. \_\_\_\_\_ iodine-131 / 8 days
6. The half-life of magnesium-28 is 21 hours. If a 40 g sample of this radioisotope began decaying now, how many hours would pass before only 2.5 g remained?

a. 63 hours c. 105 hours

b. 84 hours d. 126 hours

1. Which of the following applies to isotopes of an element?

|  |  |
| --- | --- |
| I. | They have the same number of protons. |
| II. | They have the same number of neutrons. |
| III. | They have the same number of electrons. |
| IV. | They have the same atomic number. |
| V. | They have the same mass number. |

a. I., II., and III. only c. II., III., and IV. only

b. I., III., and IV. only d. III., IV., and V. only

**Use the following information and graph to answer the next three questions.**

A radioisotope decays via beta emission to a stable isotope in one step. The decay curve for this is shown below.



1. The half-life of this radioisotope is approximately:

a. 5 days c. 15 days

b. 10 days d. 20 days

1. What mass of the parent isotope remains after 25 days?

a. 6.25 g c. 25.0 g

b. 12.5 g d. 50.0 g

1. How much time has elapsed since the parent isotope’s original mass of 200 g began decaying if 187.5 g of the daughter isotope have been produced?

a. 10 days c. 25 days

b. 20 days d. 30 days

1. Carbon-14 is radioactive, while its daughter nucleus nitrogen-14 is stable. This fact suggests that the instability of the carbon-14 nucleus may result from:

a. too many protons relative to neutrons in the nucleus

b. too much mass in the nucleus

c. too many electrons relative to protons in the nucleus

d. too many neutrons relative to protons in the nucleus

1. Which of the following nuclear decay processes would form a daughter nucleus with an atomic number larger than the parent nucleus?

a. -decay c. -decay

b. -decay d. -decay

1. Which of the following represents a nuclear fusion reaction?

|  |  |
| --- | --- |
| a. | U + n  Kr + Ba + 3 n + energy |
| b. | H + H  He + n + energy |
| c. | U  Th + He + energy |
| d. | Fe + e  Mn + energy |

1. Consider the following nuclear equation:

He + ?  He + 2 H

Which of the following represents the missing particle?

a. H c. H

b. He d. He

1. The majority of the energy released from a hydrogen bomb results from:

|  |  |  |  |
| --- | --- | --- | --- |
| a. | a controlled fission chain reaction | c. | a controlled fusion chain reaction |
| b. | an uncontrolled fission chain reaction | d. | an uncontrolled fusion chain reaction |

1. Lithium-6 and Lithium-7 are isotopes. Refer to the subatomic particles that make up the atoms of these isotopes.

(**3 marks**)

1. How are they similar?
2. How are these isotopes different?
3. State which isotope is heavier and explain why.
4. If 100 grams of carbon-14 were present in a bone sample, how many grams would be left after the following periods? (4 marks)
5. 5730 years \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. 11460 years \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Three half-lives \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. How many years have gone by if there are 25 grams of carbon-14 left?
9. Provide the nuclear symbol for the parent nucleus for each of the following: (3 marks)
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 $$(alpha decay)
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 $$ (beta decay)
12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡪 $$ (gamma decay)

**Answer Key**

|  |  |
| --- | --- |
| 1. T
 | 11. B |
| 1. F
 | 12.A |
| 1. T
 | 13.A |
| 1. F
 | 14.B |
| 1. C
 | 15.D |
| 1. E
 | 16.B |
| 1. D
 | 17.B |
| 1. A
 | 18.D |
| 1. B
 | 19.D |
| 1. B
 |  |

20. a) Same atomic number, same number of protons, same element, same number of electrons

b) Different mass number, different number of neutrons

c) Lithium-7 is heavier because it has an extra neutron, therefore a higher mass number.

21. a) 50 grams

b) 25 grams

c) 12.5 grams

d) 11460 years

22. a) $$

b) $$

c) $\*$