

Chapter 10 Quiz

Part A: Modified True/False

Indicate in the left-hand column whether each statement is true or false. If the statement is false, change the statement to make it true.

- ____ 1. Radiation is defined as the spontaneous emission of radiation from the nucleus of an atom. _____
- ____ 2. Isotopes of the same element have different chemical properties. _____
- ____ 3. When an atom emits an alpha particle, its mass number decreases by 2 atomic mass units. _____

Part B: Completion

Complete each of the following sentences.

4. Cathode rays are made of particles that are now known as _____.
5. An atom of lead (Pb)-204 has _____ neutrons.
6. Gamma decay can occur when a nucleus is in a(n) _____ state.

Part C: Matching

Match each form of radiation to its description. Then put the forms of radiation in order of their penetrating ability, from least penetrating to most penetrating.

- | | |
|------------------------|-------------------------------|
| ____ 7. alpha particle | (a) electron |
| ____ 8. beta particle | (b) electromagnetic radiation |
| ____ 9. gamma ray | (c) helium nucleus |

Part D: Multiple Choice

Circle the letter beside the answer that best completes the statement or answers the question.

10. What does the amount of radiation given off by a sample of uranium depend on?
- the amount of uranium in the sample
 - the temperature of the uranium sample
 - the amount of pressure applied to the uranium sample
 - the particular uranium compounds that exist in the sample
11. Which best describes gamma decay?
- | | |
|---------------------------------|--|
| A. emission of a proton | C. emission of an electron |
| B. emission of a helium nucleus | D. emission of electromagnetic radiation |

Chapter 10 Quiz (continued)

12. In a cloud chamber, gamma rays produce no track because they do not have which of the following?
- A. mass
B. energy
C. charge
D. movement
13. Which of the following have the same half-life?
- A. all atoms of the same isotope
B. all atoms of the same element
C. all atoms of the same atomic mass
D. all atoms of all radioactive isotopes
14. Uranium-235 has a half-life of about 700 million years. After how many years will 25% of the parent nuclei remain?
- A. 70 million years
B. 1400 million years
C. 350 million years
D. 2100 million years
15. Which equation shows a correct representation of beta decay?
- A. ${}_{90}^{232}\text{Th} \rightarrow {}_{88}^{228}\text{Ra} + {}_2^4\text{He}$
B. ${}_{87}^{221}\text{Fr} \rightarrow {}_{89}^{225}\text{Ac} + {}_2^4\text{He}$
C. ${}_{93}^{239}\text{Np} \rightarrow {}_{94}^{239}\text{Pu} + {}_{-1}^0\text{e}$
D. ${}_{8}^{19}\text{O} \rightarrow {}_{7}^{19}\text{N} + {}_{-1}^0\text{e}$
16. A sample of material contains 6000 radioactive atoms of a particular parent isotope. How many atoms of the parent isotope will remain in the sample after three half-lives?
- A. 300
B. 1800
C. 750
D. 2000

Part E: Short Answer

17. During beta decay, the nucleus of the atom emits an electron.
- (a) Explain why this statement seems contrary to your knowledge of the structure of an atom's nucleus.
- _____
- _____
- (b) Explain how it is possible.
- _____
- _____
18. Write the equation for the beta decay of tin-121.