Alpha Decay Quiz Answer Key PDF

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Which of the following best describes the penetration power of alpha particles?

A. High
B. Moderate
C. Low ✓
D. Extremely high

Describe the process of alpha decay and its impact on the original atom's nucleus.

Alpha decay occurs when an unstable nucleus emits an alpha particle (helium nucleus), leading to a decrease in atomic number by 2 and mass number by 4, transforming the original atom into a different element.

Which safety precautions are necessary when handling alpha emitters?

A. Wearing lead aprons
B. Using gloves and masks ✓
C. Ensuring proper ventilation ✓
D. Using thick concrete barriers

What happens to the atomic number of an element after alpha decay?

A. It increases by 2
B. It decreases by 2 ✓
C. It remains the same
D. It decreases by 4

How does alpha decay contribute to the stability of a radioactive nucleus? Provide an example.

Alpha decay contributes to the stability of a radioactive nucleus by emitting an alpha particle (two protons and two neutrons), which decreases the nucleus's mass and atomic number, thus moving it towards a more stable state.

Which of the following materials can stop alpha particles?

A. Lead

B. Aluminum foil

C. Paper ✓

D. Concrete

Explain why alpha particles have low penetration power compared to other types of radiation.

Alpha particles have low penetration power compared to other types of radiation due to their large mass and positive charge, which result in significant interactions with matter that quickly absorb their energy.

Discuss the potential health risks associated with exposure to alpha particles and how they can be mitigated.

The potential health risks associated with exposure to alpha particles include lung cancer and other tissue damage due to their high ionizing power, particularly when alpha-emitting materials are inhalated or ingested. These risks can be mitigated by implementing safety measures such as using protective equipment, ensuring proper ventilation, and adhering to regulatory guidelines to limit exposure.

What is an alpha particle composed of?

A. 1 proton and 1 neutron

B. 2 protons and 2 neutrons ✓

C. 2 electrons and 2 protons

D. 3 protons and 3 neutrons

Which element is commonly known to undergo alpha decay?

A. Carbon-14

B. Uranium-238 ✓

C. Iodine-131

D. Cesium-137

Write the nuclear equation for the alpha decay of Uranium-238.

\(\text{^{238}_{92}U} \rightarrow \text{^{234}_{90}Th} + \text{^{4}_{2}He} \)

Compare and contrast alpha decay with beta decay in terms of particles emitted and changes in the nucleus.

Alpha decay emits an alpha particle, reducing the atomic number by 2 and mass number by 4, while beta decay emits a beta particle, changing a neutron to a proton or vice versa, altering the atomic number by 1 without changing the mass number.

What is the charge of an alpha particle?

A. +1
B. -1
C. +2 ✓
D. 0

Alpha decay typically results in the formation of which type of element?

A. A lighter element ✓
B. A heavier element
C. An isotope of the same element
D. A non-radioactive element

What is the primary reason for alpha decay in a nucleus?

A. To increase atomic mass
B. To achieve nuclear stability ✓
C. To emit gamma rays
D. To increase the number of neutrons

Which of the following are characteristics of alpha particles?

A. High mass ✓

B. High penetration power
C. Positive charge ✓
D. Short range in air ✓

What are potential applications of alpha particles?

A. Cancer treatment ✓
B. Smoke detectors ✓
C. Power generation in nuclear reactors
D. Imaging in medical diagnostics

Which isotopes are known to undergo alpha decay?

A. Uranium-238 ✓
B. Radium-226 ✓
C. Carbon-14
D. Polonium-210 ✓

What changes occur in the nucleus during alpha decay?

A. Loss of 2 protons ✓
B. Gain of 2 neutrons
C. Loss of 2 neutrons ✓
D. Gain of 2 electrons

Which of the following statements about alpha decay are true?

A. It increases the atomic number of the element.
B. It decreases the mass number by 4. ✓
C. It results in the emission of a helium nucleus. ✓
D. It is a form of beta decay.