Radiation Types and Uses

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Alpha particles are helium nuclei. Beta-minus particles are electrons emitted in nuclear decay. Gamma radiation consists of high-energy photons.

1 Which type in the introduction has positive charge?

(1) Alpha

(2) Beta-minus

(3) Gamma

(4) All three

2 Explain why gamma emission can change a nucleus’s energy without changing its mass number or atomic number. [1]

Answer and work

3 Which pair consists of one massive charged particle and one uncharged photon?

(1) Alpha and beta-minus

(2) Alpha and gamma

(3) Two alpha particles

(4) Two beta-minus particles

4 Explain why an observation that one barrier reduces a reading does not establish that it blocks every type of radiation. [1]

Answer and work

Comparing Readings in a Shielding Model

Use the information below to answer the questions.

Three sources give the same detector count in an unshielded simulation. Each row shows the count when one barrier is placed between the source and the detector. The materials and detector settings are fixed.

Source	No barrier (counts)	Barrier X (counts)	Barrier Y (counts)
P	100	2	1
Q	100	70	4
R	100	98	74

5 Which source’s reading changes least when barrier X is introduced?

(1) P

(2) Q

(3) R

(4) All three change equally.

6 Calculate the decrease in Q’s count when barrier Y is introduced, compared with no barrier. [1]

Answer and work

7 Which source best fits a model use where the detector must still register at least 50 counts behind barrier Y?

(1) P only

(2) Q only

(3) R only

(4) P and Q

8 A student says barrier X and barrier Y have the same effect on Q. Use the readings to evaluate the claim. [1]

Answer and work