Distinguishing Two Photon Emission Records

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A display shows two model events in which a photon carries away energy. The source of the photon can be a change inside the nucleus or a change in an electron’s energy. The table tracks which part of each atom changes.

Event	Nuclear energy	Electron energy	Protons and neutrons
R	Decreases	Unchanged	Unchanged
S	Unchanged	Decreases	Unchanged

1 Which event represents gamma emission from the nucleus?

(1) R only

(2) S only

(3) Both R and S

(4) Neither R nor S

2 Explain why the nucleus in R keeps both its mass number and atomic number. [1]

Answer and work

A student sees only the proton and neutron columns for R and concludes that the atom did not emit anything. The full record includes the detected photon.

3 Explain why the unchanged counts can still fit the photon reading. [1]

Answer and work

4 Another student says any photon emitted by an atom must come from its nucleus. Which record is a counterexample, and what measurement makes it one? [1]

Answer and work