Tracing Two Paths to the Same Daughter

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

A museum simulation follows two radioactive parent nuclei. Both records end with a daughter nucleus of lead-210. The model tracks mass number and atomic number for the parent, daughter, and emitted particle.

Record	Parent mass number	Parent atomic number	Daughter mass number	Daughter atomic number
R	214	84	210	82
S	210	81	210	82

1 Determine the mass number and atomic number of the emitted particle in R. Show how each number follows from the record. [1]

Answer and work

2 Which emitted particle balances record S in this model?

(1) A proton

(2) A neutron

(3) An alpha particle

(4) A beta-minus particle

A new simulation event shows the same lead-210 daughter. The summary omits the parent record but displays that the emitted particle has atomic number −1.

3 Use both sources of evidence to select R or S for the new event. Explain why the daughter label by itself could not decide. [1]

Answer and work

4 Use the periodic table to identify the elements of the two parent nuclei. Include the atomic number of each in your answer. [1]

Answer and work