Separating Photon Counts From Decay Counts

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

A classroom nuclear simulation compares two model parents. Each decay of X emits two photons and each decay of Y emits one. Each photon reaching the first detector contributes one count. The detector records every photon in this model.

Parent sample	Photon counts during the same interval
X	64
Y	32

1 How many X nuclei decayed during the interval?

(1) 16

(2) 32

(3) 64

(4) 128

2 A student concludes that twice as many X nuclei decayed because X gave twice as many counts. Evaluate the claim using both emission rules. [1]

Answer and work

A second detector can group all photons from one decay into one event. Assume it detects both samples completely and groups them correctly.

3 Predict the event readings for both samples over that same interval. Explain why the count comparison changes. [1]

Answer and work

4 Explain why equal event readings over one interval still do not establish that X and Y have the same half-life. [1]

Answer and work