Checking a Decay Record With New Parents

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

A classroom simulation starts each of two runs with 80 parent nuclei of the same isotope and no daughters. In each interval, half the parents present at the start of the interval decay. Every decay produces one stable daughter. The two intervals have equal duration.

Run	Parents at start	Parents just before second interval	Parents at end	Total daughters at end
P	80	40	20	60
Q	80	60	30	70

1 How many parents decay during the second interval of Q?

(1) 20

(2) 30

(3) 40

(4) 70

2 Use the second intervals to explain whether the runs show the same fraction of parents decaying. [1]

Answer and work

In Q the simulation can add new parents between the intervals. It removes no nuclei and introduces no daughter nuclei.

3 Use the Q record to calculate how many new parents entered between the intervals. Show one way to find the addition. [1]

Answer and work

4 Evaluate a claim that the higher final parent count in Q means its isotope must have a longer half-life. [1]

Answer and work