Following a Daughter After the Parent Is Gone

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

A nuclear simulation has parent P and unstable daughter D. Over one model interval, half of the D nuclei present at the start decay. While the parent source is enabled, it adds new D nuclei at the end of the interval. The event counter in this case counts only D decays.

Source during the second interval	**D at start of that interval**	**New D added at its end**
P, parent source stays on	20	10
Q, parent source turns off	20	0

1 How many D decays occur in each trial during the second interval?

(1) P gives ten and Q gives zero.

(2) Both give ten.

(3) P gives twenty and Q gives ten.

(4) Both give zero.

2 Calculate the D count at the end of the second interval for each source schedule. [1]

Answer and work

3 A student uses the second interval’s daughter decay count to identify which source is still on. Explain why that evidence is insufficient. [1]

Answer and work

Each source keeps its second-interval setting for a third interval. The same decay rule applies.

4 Compare the expected daughter decay counts in the third interval. Explain how these readings help distinguish the source schedules. [1]

Answer and work