Checking a Parent and Daughter Age Model

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

A mineral display uses a classroom decay simulation. Each parent nucleus that decays produces one stable daughter nucleus. No nuclei enter or leave the grain. The simulation initially assumes the grain contained parent nuclei only.

Quantity measured now	**Number of nuclei in the model**
Parent	24
Daughter	72

1 Under the initial assumption, calculate the original parent count. Show how the daughter count enters your calculation. [1]

Answer and work

2 How many half-lives have passed under that assumption?

(1) One half-life

(2) Two half-lives

(3) Three half-lives

(4) Four half-lives

A second model allows 48 of the measured daughter nuclei to have been present from the start. The final measurements remain 24 parents and 72 daughters.

3 Use the revised model to calculate the original parent count and the number of half-lives elapsed. [1]

Answer and work

4 Explain why assigning every daughter nucleus to decay would give an age that is too large under the revised model. [1]

Answer and work