

Radioactive dating of meteorites

Post-16

Topics covered: Radioactive decay, half-life, radioactive dating

Watch the video "How do we know how old the Sun is?"

<https://vimeo.com/88978362>

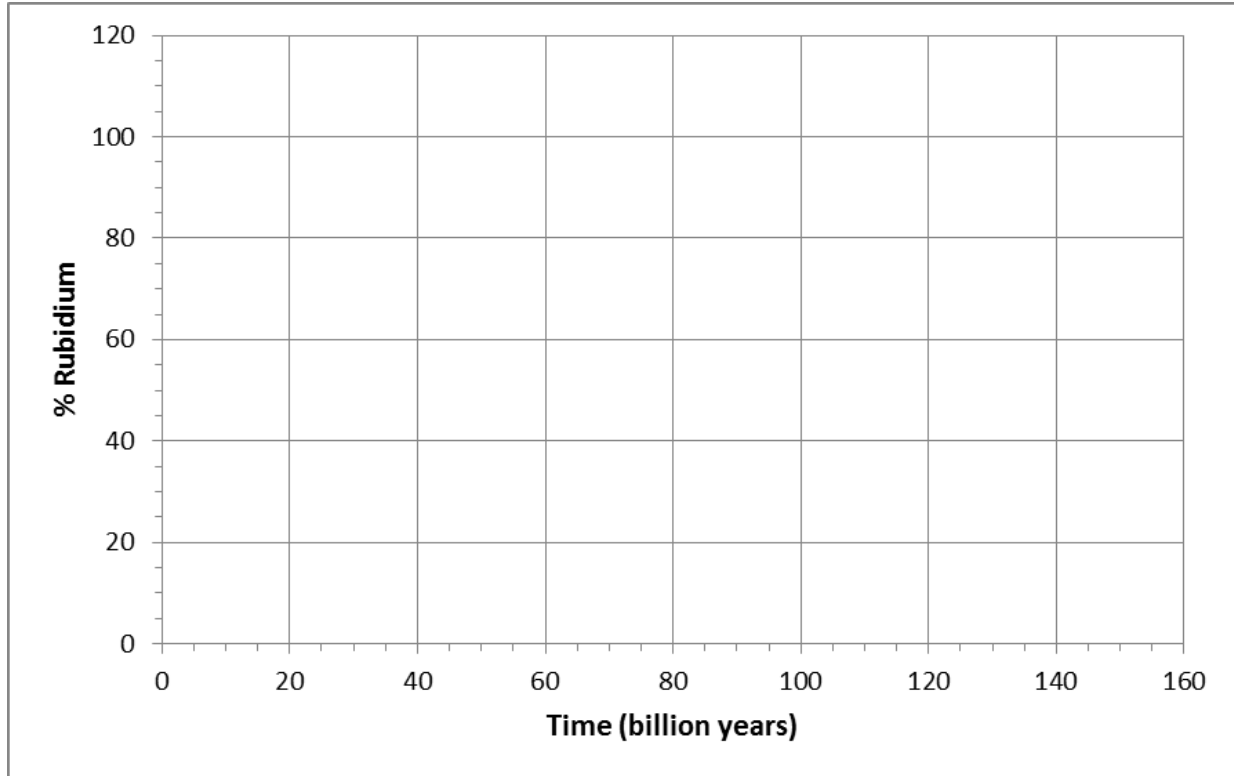


Meteorites can be dated by analysing the element rubidium present in the rock. The half-life of an element is the time it takes for it to decay to half of its original amount. This can be calculated from the formula below:

$$t_{\frac{1}{2}} = \frac{\ln(2)}{\lambda}$$

where $t_{1/2}$ is the half-life in years and λ is the decay constant, for rubidium this is $1.397 \times 10^{-11} \text{ yr}^{-1}$.

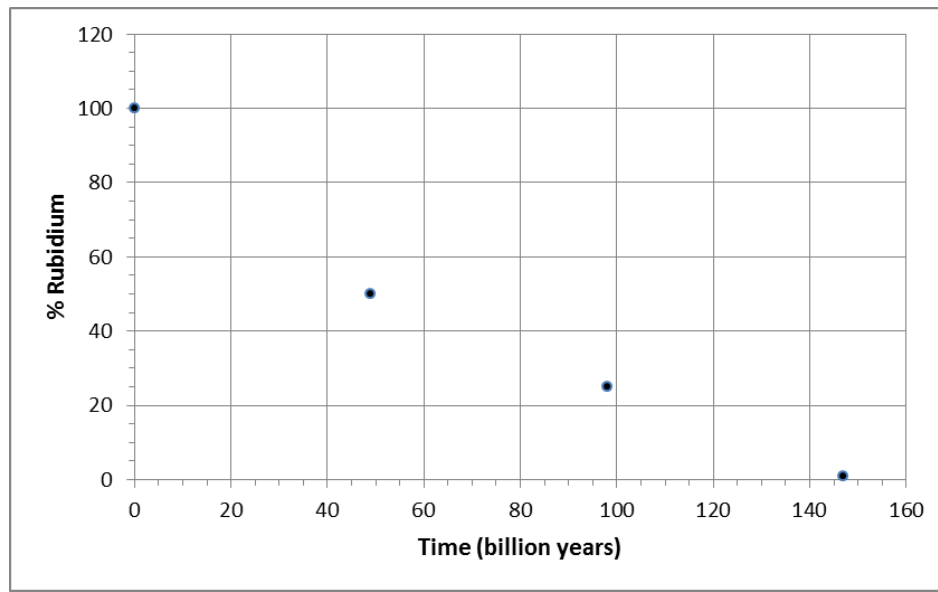
1. Calculate the half-life of rubidium.
2. Plot the decay of rubidium on the graph on the next page. Join the points - the graph should show an exponential decay.
3. Using the graph work out how old a meteorite is if the amount of rubidium contained within has dropped to 94% of its original value.



Radioactive dating of meteorites: **ANSWERS**

Post-16

1. Rubidium decays into strontium with a half-life of 48.8 billion years.
2. Half-life graph:



3. 4.4×10^9 years (4.4 billion years ~ age of Solar System)