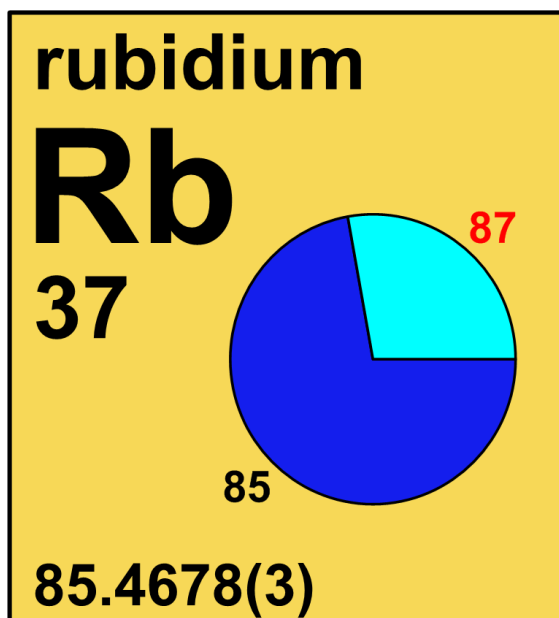


4.37 rubidium



Stable isotope	Relative atomic mass	Mole fraction
^{85}Rb	84.911 789 74	0.7217
$^{87}\text{Rb}^\dagger$	86.909 180 53	0.2783

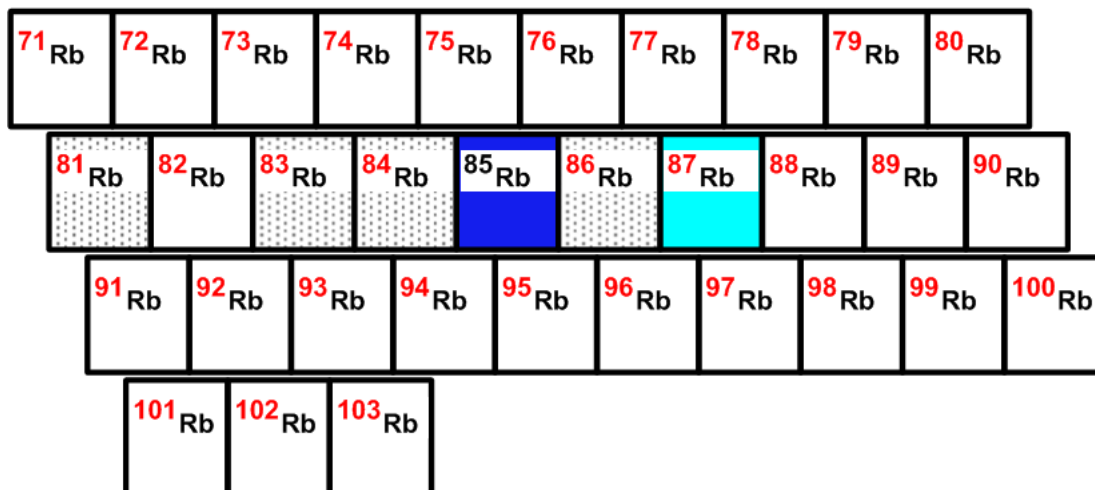
† **Radioactive isotope** having a relatively long **half-life** (4.97×10^{10} years) and a characteristic terrestrial **isotopic composition** that contributes significantly and reproducibly to the determination of the **standard atomic weight** of the **element in normal materials**.

Half-life of radioactive isotope

Less than 1 hour

Between 1 hour and 1 year

Greater than 1 year

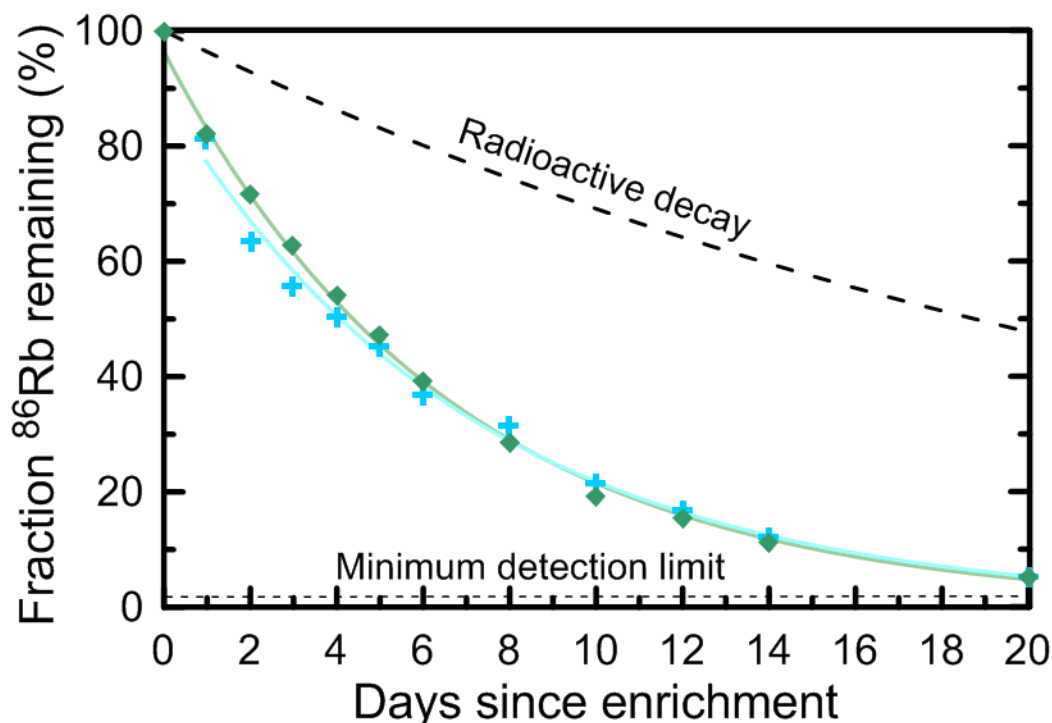


4.37.1 Rubidium isotopes in biology

Due to biological similarities between rubidium and potassium, the **radionuclide** ^{86}Rb (with a half-life of 18.7 days) is used as a **tracer** in biological or medical investigations for applications where the half-life of the radio-tracer ^{42}K (half-life = 0.5 day) is too short [107]. ^{86}Rb (with a half-life of 18.7 days) has been used to measure the **metabolism** in small vertebrates (Figure 4.37.1), such as dunnarts (furry, narrow-footed marsupials about the size of a mouse) [288]. The advantage of this technique over the standard doubly labelled water method, using water enriched in ^2H and ^{18}O , include lower equipment requirements, lower technical expertise, and

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- 1 longer time spans over which measurements can be made. This technique could be very useful
2 for measuring the metabolism of amphibians and insects.



- 3
4 **Fig. 4.37.1:** Exponential decay of ^{86}Rb for *Sminthopsis macroura* (striped-faced dunnart; an
5 Australian marsupial that weighs between 15 and 25 g; turquoise crosses) and *Sminthopsis*
6 *ooldea* (an Australian marsupial called the Troughton's dunnart that weighs between 10 and 18 g;
7 green diamonds) in **thermoneutrality** (after [288]). The solid lines are the best fit of the fraction
8 of initial enrichment remaining, taking into account both **radioactive decay** and biological
9 elimination of ^{86}Rb .

10

11 4.37.2 Rubidium isotopes in geochronology

- 12 ^{87}Rb (with a half-life of 4.97×10^{10} years) is a long-lived **radioisotope** that is transformed into
13 ^{87}Sr by emission of a beta-minus particle (an **electron**) and an **antineutrino**. From the
14 abundance of ^{87}Sr and the Rb/Sr **mole ratio** in a rock, its age of crystallization can be calculated.
15 Rb/Sr dating is one of the most widely employed techniques for dating geological samples [289].

16 4.37.3 Rubidium isotopes in medicine

- 17 ^{82}Rb (with a half-life of 75 seconds) acts similarly to potassium and is used for imaging of the
18 heart to better assess heart muscle function as a radioactive analog to potassium [290, 291]. ^{82}Rb
19 is being considered as an alternative to highly-enriched uranium for producing medically
20 important radioisotopes [290].