5 Radioactivity – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	**中文**	**Write it 3 times** (English)		
unstable	不稳定			
radiation	辐射			
radioactive decay	放射性衰变			
random	随机			
spontaneous	自发			
ionising	电离			
paper	纸			
aluminium	铝			
lead	铅			
penetrating	穿透			
half-life	半衰期			
cells	细胞			
dose	剂量			
shielding	屏蔽			

Recall

From Part 1 you know some nuclei are **unstable** 不稳定. An unstable nucleus breaks down and gives out **radiation** 辐射 – this is **radioactive decay** 放射性衰变.

- Decay is **random** 随机 and **spontaneous** 自发 (you cannot speed it up or slow it down).
- There are three types of radiation.

Nothing here is hard – it just compares the three types.

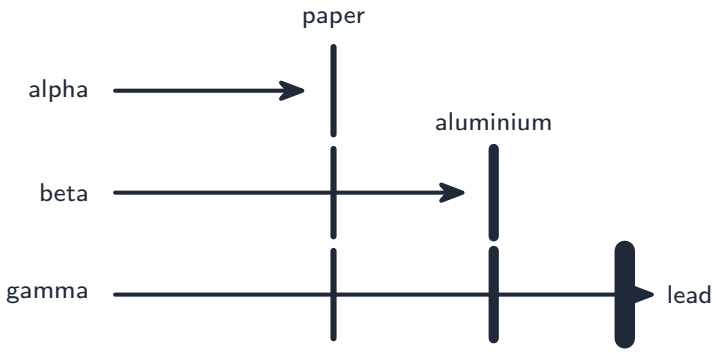
New ideas

Read these first, then do the Practice.

■ 1 Three types of radiation

All three are **ionising** 电离 (they knock electrons off atoms):

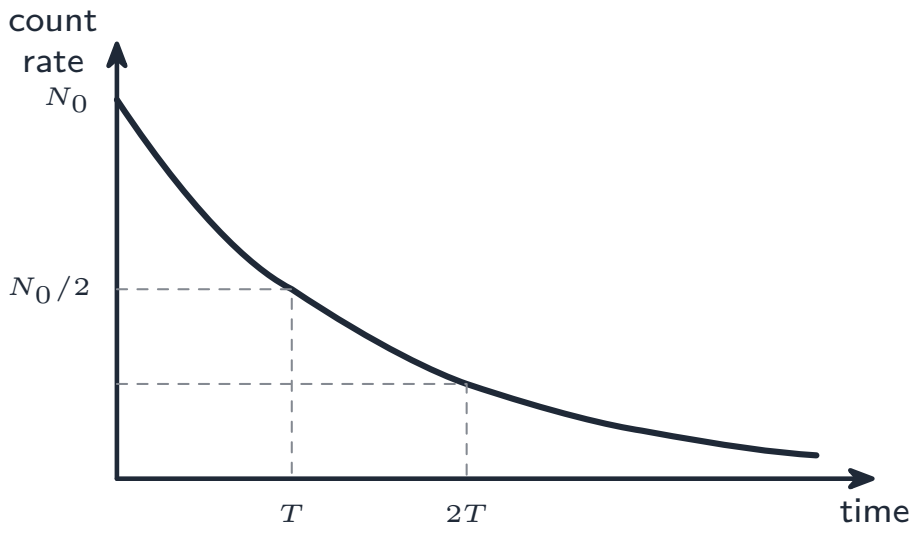
Type	What it is	Stopped by
alpha (α)	a helium nucleus (charge +2)	a sheet of **paper** 纸
beta (β)	a fast electron (charge −1)	a few mm of **aluminium** 铝
gamma (γ)	a high-energy wave (no charge)	thick **lead** 铅 (only reduced)



So alpha is the most **ionising** but least **penetrating** 穿透; gamma is the least ionising but most penetrating.

■ 2 Half-life

The **half-life** 半衰期 is the time for **half** the unstable nuclei in a sample to decay. After each half-life the count rate falls to half.



3 Safety

Radiation harms living **cells** 细胞. Keep the **dose** 剂量 low by: **less time** near the source, **more distance**, and **shielding** 屏蔽 (such as lead).

Watch out: alpha is the most **ionising** but the *least* **penetrating**; gamma is the opposite. A half-life **halves** the count rate – after two half-lives the rate is a *quarter*, not zero.

Practice

Try these in order.

5.1 Name the three types of radiation. [3]

5.2 Which type is stopped by a sheet of paper? [1]

5.3 Which type is the most penetrating? [1]

5.4 Define the *half-life* of a radioactive isotope. [1]

5.5 A source has a count rate of 800 counts/min and a half-life of 3 hours. What is the count rate after 6 hours? [2]

5.6 State two ways to reduce the radiation dose you receive. [2]

5.7 Challenge. A sample starts at 1600 counts/min and has a half-life of 2 hours. After how many hours will the count rate fall to 200 counts/min? [3]

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