IGCSE PHYSICS • HOLIDAY HOMEWORK 假期作业

# 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.

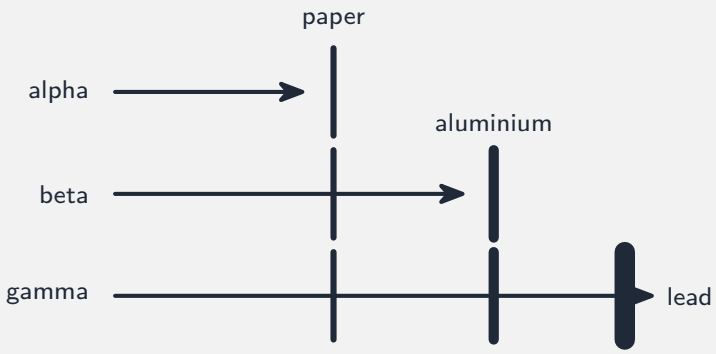
## New ideas

Read these first, then do the Practice.

### 1 Three types of radiation

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

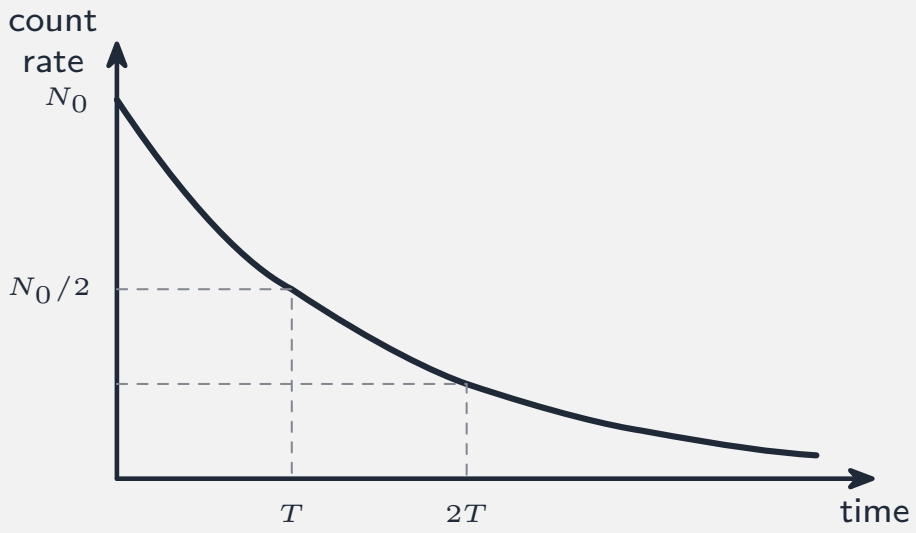
| Type | What it is | Stopped by |
|---|---|---|
| alpha ($\alpha$) | a helium nucleus (charge +2) | a sheet of **paper** 纸 |
| beta ($\beta$) | a fast electron (charge −1) | a few mm of **aluminium** 铝 |
| gamma ($\gamma$) | a high-energy wave (no charge) | thick **lead** 铅 (only reduced) |




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]