Your notes

GCSE Physics: revision notes

Uses and hazards of radiation

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Contamination and irradiation

- Radioactive **contamination** is the unwanted presence of materials containing radioactive atoms on or in other materials. The hazard comes from the decay of the contaminating atoms, and the type of radiation affects how dangerous it is.
- **Irradiation** is exposing an object to nuclear radiation. An irradiated object does not become radioactive.
- Precautions: shielding, handling sources with tongs, wearing gloves, keeping sources away from the body and minimising exposure time.
- Research on the effects of radiation is published and shared with other scientists so it can be checked by peer review.

Dangers inside and outside the body

- Outside the body, beta and gamma are the most dangerous because they can penetrate the skin. Alpha is stopped by skin.
- Inside the body (if swallowed or breathed in), alpha is the most dangerous because it is so strongly ionising and all its energy is absorbed by nearby cells.
- Ionising radiation can damage cells and DNA, causing mutations and cancer, or kill cells.

Background radiation (separate sciences)

- **Background radiation** is around us all the time. Natural sources include rocks (such as granite, which releases **radon** gas) and cosmic rays from space.
- Man-made sources include fallout from nuclear weapons testing, nuclear accidents and medical X-rays.
- The level of **background radiation**, and the radiation dose, depend on where you live and your job. Radiation dose is measured in **sieverts** (Sv), often millisieverts (mSv).

Uses of nuclear radiation (separate sciences)

- Medical **tracers**: a gamma emitter with a short half-life is injected or swallowed and detected outside the body to explore internal organs.
- **Radiotherapy**: gamma rays, or radioactive implants, are used to control or destroy cancer cells. They are carefully aimed to limit damage to healthy tissue.
- Gamma rays are also used to sterilise medical equipment and food. Smoke detectors use alpha sources.

Key terms

Contamination	The unwanted presence of radioactive atoms on or in a material.
Irradiation	Exposing an object to nuclear radiation; it does not become radioactive.
Background radiation	Radiation that is around us all the time from natural and man-made sources.
Sievert	The unit of radiation dose (Sv).
Tracer	A radioactive isotope put into the body so its path can be followed.
Radiotherapy	Using radiation to destroy cancer cells.
Radon	A radioactive gas released from some rocks.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is irradiation?
2. What is radioactive contamination?
3. Which radiation is most dangerous inside the body?
4. Which radiations are most dangerous outside the body?
5. How can ionising radiation harm the body?
6. Why should you handle radioactive sources with tongs?
7. Which is a natural source of background radiation? (Separate sciences)
8. What is the unit of radiation dose? (Separate sciences)

Answers

1. Exposing an object to nuclear radiation
2. Unwanted radioactive atoms on or in a material
3. Alpha
4. Beta and gamma
5. It damages cells and DNA, which can cause cancer
6. To keep them away from your body
7. Rocks such as granite
8. Sievert (Sv)

Your notes

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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