

Unstable nuclei, decay and half-life

Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test has 8 questions worth 20 marks. Show your working in calculations, include units, and use the correct scientific terms in explanations. A calculator is allowed. You have 45 minutes.

Level: Physics grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** HS-PS1-8, GCSE P4

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Stopping radiation (2 marks)

State which type of radiation is stopped by a sheet of paper, and which type needs thick lead to reduce it.

Question 2 Alpha decay equation (3 marks)

Uranium-234 has the atomic number 92 and decays by emitting an alpha particle. Thorium has the atomic number 90.

Give the mass number and atomic number of the new nucleus, and name it.

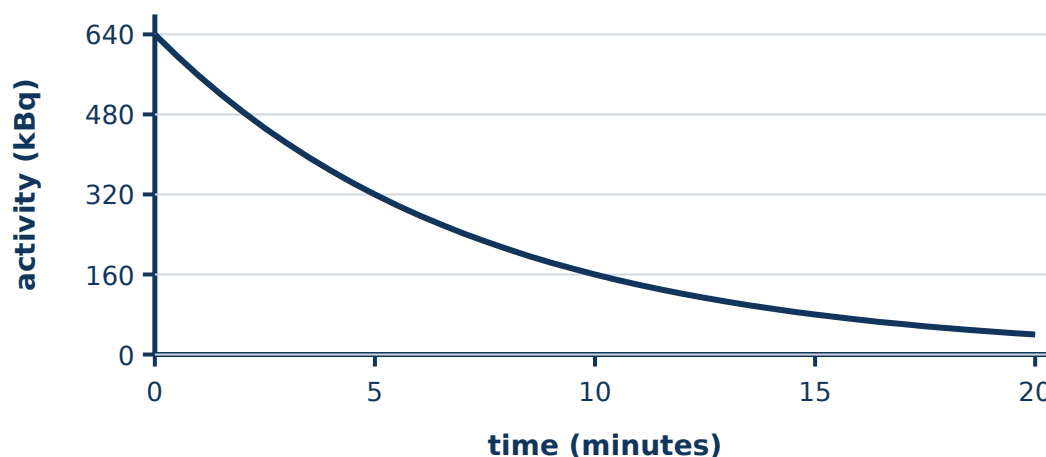
Question 3 Half-life calculation (3 marks)

A sample has an activity of 2400 Bq and a half-life of 12 days.

Calculate its activity after 36 days.

Question 4 Reading the decay graph (3 marks)

The graph shows the activity of a radioactive sample.



Activity of a radioactive sample against time.

- Use the graph to find the half-life. (1 mark)
- State the activity after 15 minutes. (1 mark)
- Calculate the time for the activity to fall to 20 kBq. (1 mark)

Question 5 Irradiation and contamination (3 marks)

Explain the difference between irradiation and contamination, and give one precaution that reduces the risk of contamination.

Question 6 Fission and fusion (2 marks)

State which process, fission or fusion, is used in nuclear power stations and which one takes place in the Sun.

Question 7 Choosing a tracer (2 marks)

A doctor needs a radioactive tracer to inject into a patient. Explain why an isotope with a half-life of 6 hours is better than one with a half-life of 6 years.

Question 8 Beta particles (2 marks)

State what a beta particle is and describe how it is produced in the nucleus.