Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: GCSE Triple Science Atomic Structure (Low Demand Questions)

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Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

Radioactive waste from nuclear power stations is a man-made source of background radiation.

(a) Which of the following is also a man-made source of background radiation?

Tick (✓) **one** box.

cosmic rays	☐
radiotherapy	☐
rocks	☐
stars	☐

(1)

(b) Nuclear power stations use the process of nuclear fission.

Complete the sentences to describe the process of nuclear fission.

Choose answers from the box.

a neutron		**a proton**	**an electron**
cosmic rays	**energy**	**gamma rays**	**x-rays**

An unstable nucleus absorbs _____ and splits into two parts.

Two or three neutrons are released, as well as _____

and _____.

(3)

(c) Plutonium-239 is one type of radioactive waste from nuclear power stations.

The following nuclear equation represents the decay of plutonium-239 (Pu-239).

$$^{239}_{94}Pu \rightarrow {}^{235}_{92}U + {}^{4}_{2}He$$

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How does the nuclear equation show that alpha radiation is emitted when plutonium-239 decays?

Tick (✓) **one** box.

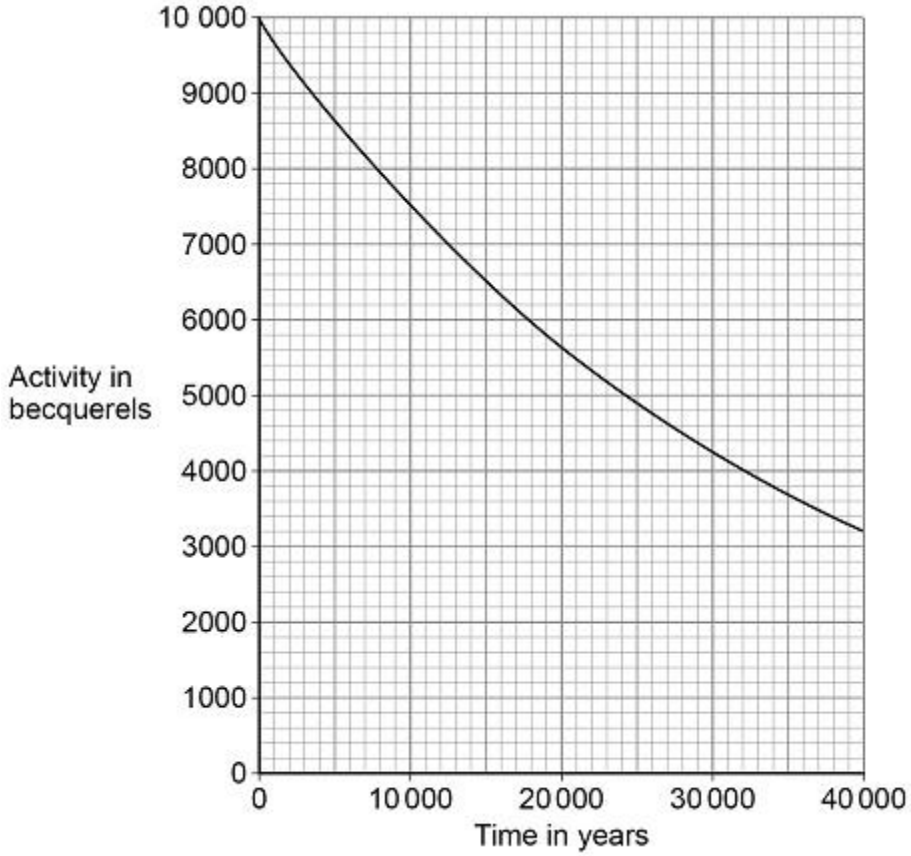
An alpha particle contains 92 protons. ☐

An alpha particle has a mass number of 235. ☐

An alpha particle is the same as a helium nucleus. ☐

(1)

The graph below shows how the activity of a sample of plutonium-239 varies with time.



(d) How much time will it take for the activity of the sample of plutonium-239 to fall to half of its initial activity?

Time = _____ years

(1)

(e) What is the half-life of plutonium-239?

Half-life = _____ years

(1)

(f) The radioactive waste from a nuclear power station is buried underground.

People are warned to stay away from places where radioactive waste is buried.

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Suggest **one** risk of going near the place where radioactive waste is buried.

_____

_____

_____

_____

(1)

(Total 8 marks)

Q2.

Polonium-210 $(^{210}_{84}\text{Po})$ is a radioactive isotope that decays by emitting alpha radiation.

(a) Which is the correct decay equation for polonium-210?

Tick (✓) **one** box.

$^{210}_{84}\text{Po} \rightarrow {}^{214}_{86}\text{X} + {}^{4}_{2}\text{He}$ ☐

$^{210}_{84}\text{Po} \rightarrow {}^{206}_{86}\text{X} + {}^{4}_{2}\text{He}$ ☐

$^{210}_{84}\text{Po} \rightarrow {}^{206}_{82}\text{X} + {}^{4}_{2}\text{He}$ ☐

(1)

(b) Why is alpha radiation dangerous inside the human body?

Tick (✓) **one** box.

Alpha radiation is electromagnetic radiation. ☐

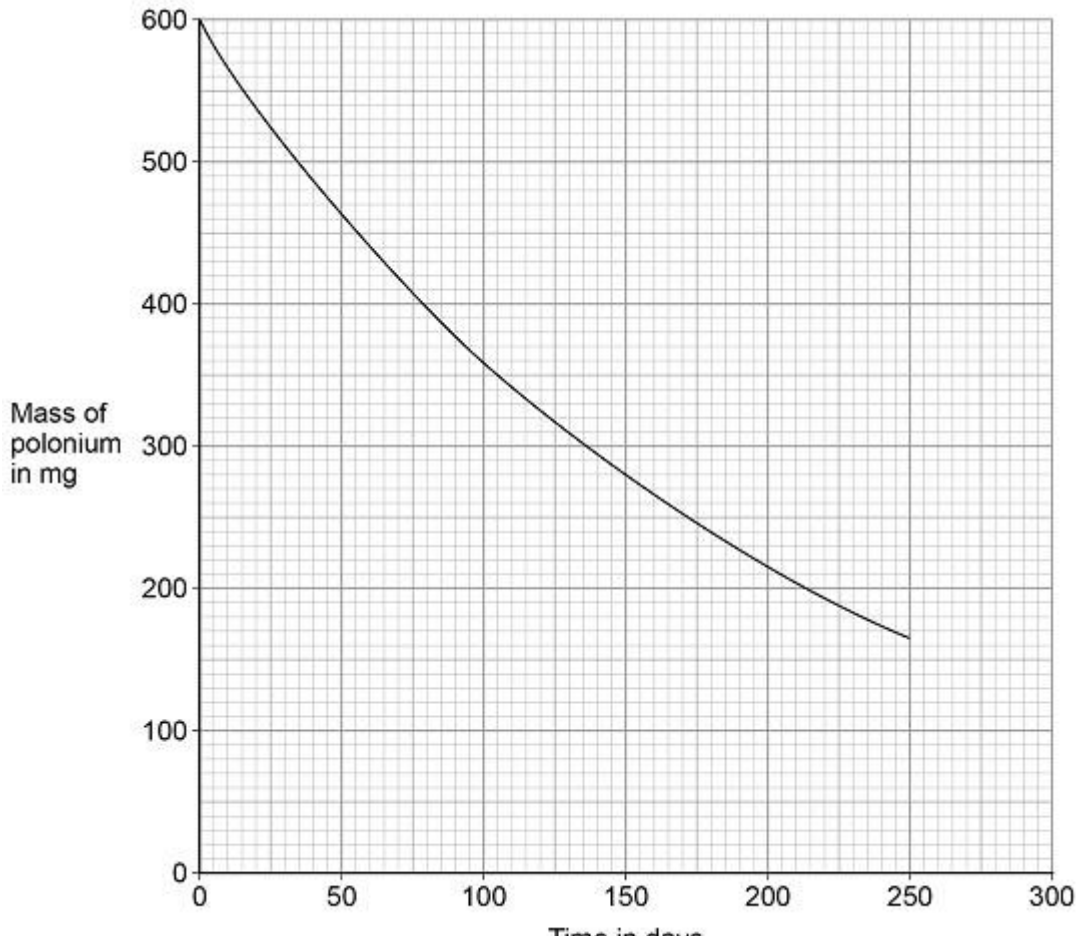
Alpha radiation is highly ionising. ☐

Alpha radiation is very penetrating. ☐

(1)

The figure below shows how the mass of a sample of polonium-210 changes with time.

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(c) Determine the change in mass of the sample of polonium-210 between 50 and 150 days.

_____

_____

_____

Change in mass = _____ mg

(2)

(d) Estimate the mass of polonium-210 remaining after 300 days.

_____

Mass = _____ mg

(1)

(e) Nuclear radiation can cause ionisation.

Complete the sentences.

Choose answers from the box.

a negative	**an electron**	**a neutron**	**a positive**	**a proton**	**a zero**

An atom becomes an ion when it loses _____.

The resulting ion has _____ charge.

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(2)
(Total 7 marks)

Q3.

The ancient Greeks thought that atoms were tiny spheres that could not be divided into anything smaller.

Since then, different discoveries have led to the model of the atom changing.

Some of the discoveries are given in the table below.

The mass of an atom is concentrated in the nucleus.	**A**
Electrons orbit the nucleus at specific distances.	**B**
The nucleus contains neutrons.	**C**
The nucleus contains positively charged protons.	**D**

(a) Which discovery was the earliest?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(b) Which discovery was the most recent?

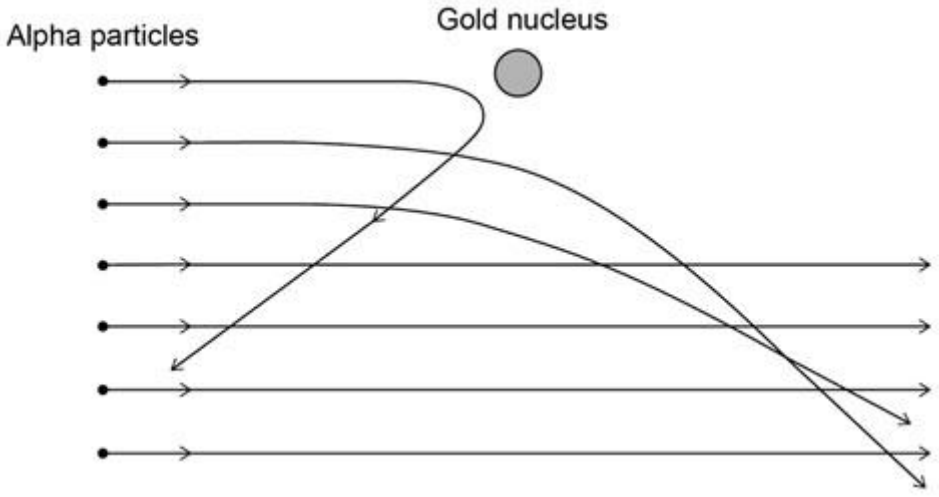
Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(c) The alpha particle scattering experiment led to the nuclear model of the atom.

The figure below shows the paths of alpha particles travelling close to a gold nucleus.



Complete the sentences.

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Choose answers from the box.

Each answer may be used once, more than once or not at all.

attracts	**decreases**	**does not change**
increases	**reflects**	**repels**

Alpha particles and gold nuclei are both positively charged.

The gold nucleus _____ the alpha particles.

As the alpha particle approaches the gold nucleus, the electric field strength experienced by the alpha particle _____.

As an alpha particle approaches the gold nucleus, the force experienced by the alpha particle _____.

(3)

(d) The results of the alpha particle scattering experiment were reproducible.

What does reproducible mean?

Tick (✓) **one** box.

- Another scientist repeats the experiment and gets the same results. ☐
- Another scientist repeats the experiment and gets different results. ☐
- The same scientist repeats the experiment and gets the same results. ☐
- The same scientist repeats the experiment and gets different results. ☐

(1)

(Total 6 marks)

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