

Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic : 6_ Radioactivity

Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Q1.

Describe what happens in the nucleus of an atom when a positron is emitted.

(2)

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(Total for question = 2 marks)

Q2.

Carbon-14 is radioactive and has a half-life of 5 700 years.

The number of radioactive carbon-14 atoms in a very old piece of wood is found to have decreased from 1 000 000 to 125 000.

Determine the age of the piece of wood.

(2)

age of wood = years

(Total for question = 2 marks)

Q3.

The nucleus of americium-238 can absorb an electron.

When this happens, one of the protons in the nucleus becomes a neutron, as shown in Figure 8.

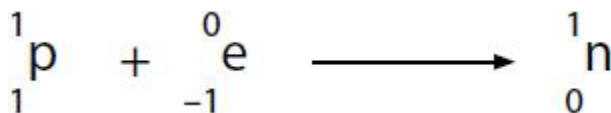


Figure 8

(i) Describe how absorbing an electron affects the proton number and the nucleon number of a nucleus.

(2)

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(ii) Deduce which nucleus is formed when americium-238 absorbs an electron.

(1)

- A uranium-234
- B uranium-235
- C plutonium-238
- D americium-238

(Total for question = 3 marks)

Q4.

Rutherford devised an experiment to fire alpha particles at thin gold foil.

The apparatus that was used in the experiment is shown in Figure 6.

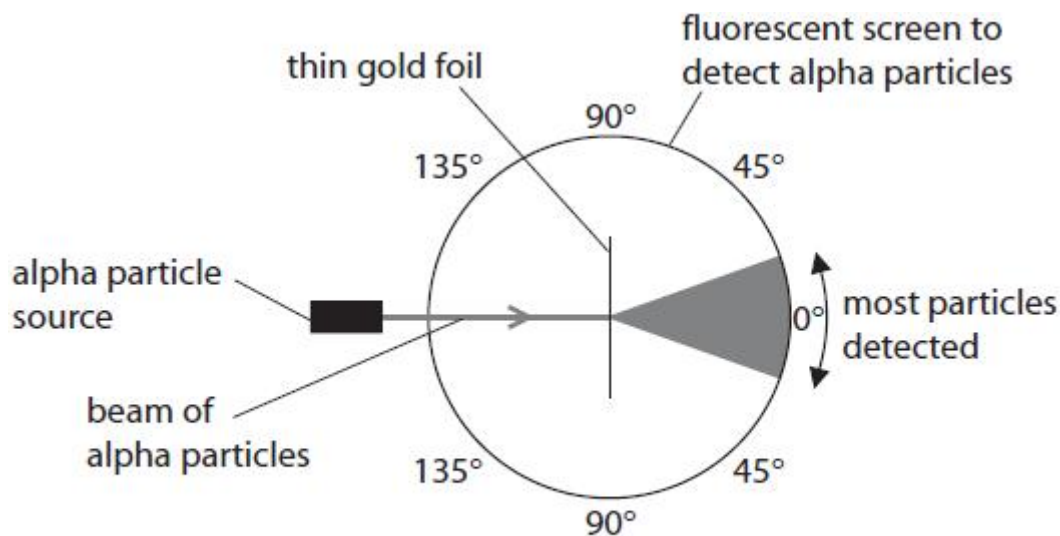


Figure 6

(i) The number of particles detected at each angle in a given time is shown on the graph in Figure 7.

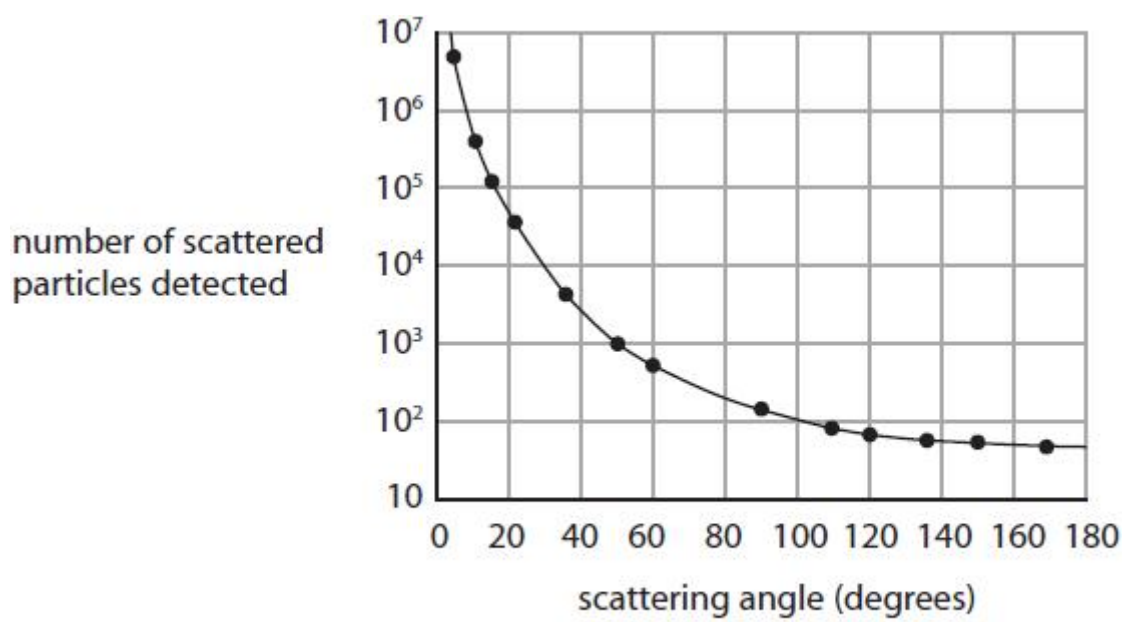


Figure 7

Use information from the graph.

Estimate the ratio of the number of particles scattered through 5° to the number of particles scattered through 100°.

(2)

ratio =

(ii) Explain how the difference in the number of particles scattered at different angles gives evidence for the current model of the structure of the atom.

(4)

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(Total for question = 6 marks)

Q5.

Ultraviolet (UV) waves from the Sun travel towards the Earth.

Ultraviolet waves can be grouped by wavelength.

The three groups of wavelengths are UVA, UVB and UVC.

Figure 4 shows, for each group,

- the wavelength range
- the effect of the Earth's atmosphere on each type of UV wave.

	UVA	UVB	UVC
wavelength range	400 nm to 315 nm	314 nm to 280 nm	279 nm to 100 nm
% energy absorbed by the Earth's atmosphere	5%	95%	100%

Figure 4

UV radiation of wavelength 365 nm is used to detect forged banknotes.

In a genuine banknote there are marks that **cannot** be seen using visible light.

These marks **can** be seen using UV radiation.

Explain why the marks can be seen when the UV radiation shines on the banknote.

Your answer should refer to the energy of electrons in atoms.

You may draw a diagram to help with your answer.

(4)

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(Total for question = 4 marks)

Q6.

Answer the question with a cross in the box you think is correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

Figure 8 is the symbol for a nucleus of americium-241.



Figure 8

Americium-241 is a radioactive isotope of americium.

Americium-241 decays by emitting alpha (α) particles.

(i) Which of these is the symbol for another radioactive isotope of americium?

(1)

- A ${}_{97}^{241}\text{Am}$
- B ${}_{96}^{243}\text{Am}$
- C ${}_{95}^{245}\text{Am}$
- D ${}_{94}^{247}\text{Am}$

(ii) Which of these is the approximate maximum distance that alpha particles can travel in air at normal atmospheric pressure?

(1)

- A 5 mm
- B 5 cm
- C 5 m
- D 5 km

(iii) Complete the equation in Figure 9 for americium-241 decaying into neptunium (Np).

(3)



Figure 9

(Total for question = 5 marks)