

GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 26

Multiple Choice Questions

P6: Radioactivity

1 Which statement describes nuclear fusion?

- A A helium nucleus joins with a hydrogen nucleus to form an alpha particle.
- B Two helium nuclei join to form a hydrogen nucleus.
- C Two hydrogen nuclei join to form a helium nucleus. ← fusion
- D Uranium nuclei split and produce high energy neutrons causing a chain reaction. ← fission

Your answer

C

[1]

2 An element has more than one isotope.

Which row correctly describes the atoms of **all** isotopes of this element?

	Numbers of electrons	Numbers of protons	Numbers of neutrons
A	different	different	different
B	same	different	different
C	same	same	different
D	same	different	same

Your answer

C

[1]

3 Radium-226 is the most abundant isotope of radium.

Its nuclear mass is 226 and its nucleus contains 138 neutrons.

Which row is correct for another isotope of radium?

- A nuclear mass 226; 137 neutrons ×
- B nuclear mass 226; 139 neutrons ×
- C nuclear mass 227; 138 neutrons ×
- D nuclear mass 227; 139 neutrons

$$\begin{aligned} 226 - 138 \\ = 88 \\ \text{protons} \end{aligned}$$

Your answer

D

$$\begin{aligned} 227 - 139 \\ = 88 \end{aligned}$$

[1]

4

Radium-226, $^{226}_{88}\text{Ra}$, decays to become radon-222, $^{222}_{86}\text{Rn}$.

What is emitted when a nucleus of radium-226 decays?

- A A beta particle
- B An alpha particle
- C Four neutrons
- D Four protons

Your answer

B

5

A radioactive source has a half-life of 80 s.

How long will it take for $\frac{7}{8}$ of the source to decay?

- A 10 s
- B 70 s
- C 240 s
- D 640 s

Time	n.o of atoms
0	800
80	400
160	200
240	100

eg
let n.o of atoms be 800 [1]

$$800 \times \frac{7}{8} = 700$$

\therefore 100 left

Your answer

C

[1]

6

Beta radiation is used to check the thickness of thin aluminium foil at a factory.

Why is beta radiation used?

- A All electromagnetic radiation is reflected by aluminium foil.
- B Beta radiation will not pass through aluminium foil.
- C Beta radiation will partially pass through aluminium foil.
- D Beta radiation is reflected by aluminium foil.

Your answer

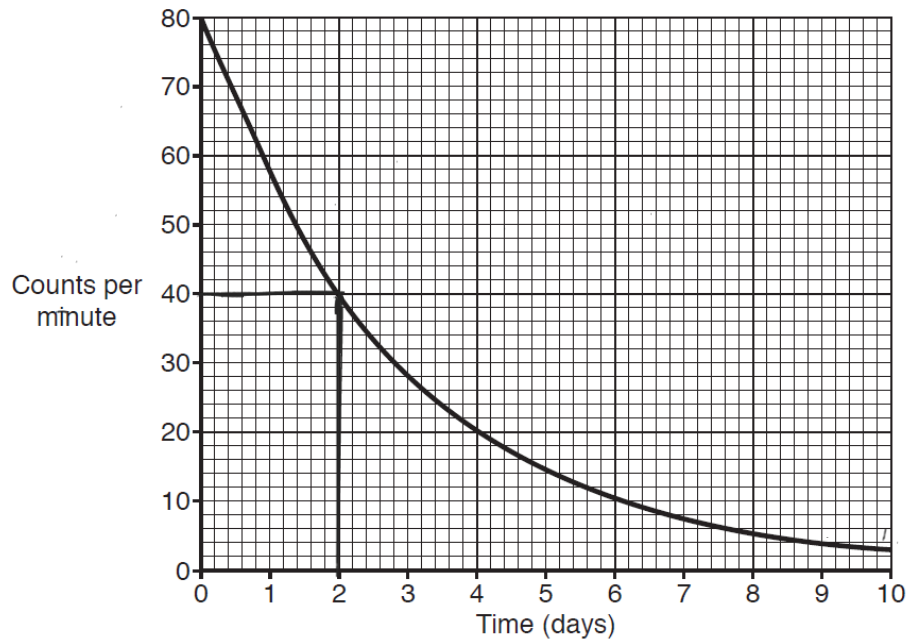
C

[1]

Beta radiation can penetrate thin aluminium foil but the amount of penetrating will vary sufficiently as thickness changes.

7

A teacher measures the radiation from a radioactive source for 10 days.



What is the half-life of this radioactive source?

- A 1 day
- B 2 days
- C 4 days
- D 5 days

Your answer

B

[1]

8

An alpha particle collides with an atom to produce a positive ion.

What happens to the atom for it to become a positive ion?

- A It loses an electron from inside the nucleus.
- B It loses an electron from outside the nucleus.
- C It loses a neutron from inside the nucleus.
- D It loses a proton from outside the nucleus.

Your answer

B

[1]

9

The table gives some information about four radioactive isotopes.

Which isotope is the best to use as a medical tracer?

	Half life	Radiation emitted
A	6 hours	alpha
B	6 hours	gamma
C	6 minutes	gamma
D	6 years	beta

Your answer

B

[1]

10

Which statement is **true** for isotopes of the same element?

N_p = number of protons and N_n = number of neutrons.

- A** $N_p = N_n$
- B** N_p is the same but N_n is different
- C** N_p is always greater than N_n
- D** The total ($N_p + N_n$) is always the same

Your answer

B

[1]

Total Marks for Question Set 2: 10

Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

Higher tier only –

$$\text{force on a conductor (at right angles to a magnetic field) carrying a current} = \text{magnetic flux density} \times \text{current} \times \text{length}$$

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