

Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

This question is about radioactivity.

Figure 3 shows a Geiger-Muller (G-M) tube attached to a counter. The G-M tube is used to measure the activity of a source of beta (β) radiation. There is an aluminium sheet between the beta source and the G-M tube. The counter is switched on and after 1 minute shows a count of 268.

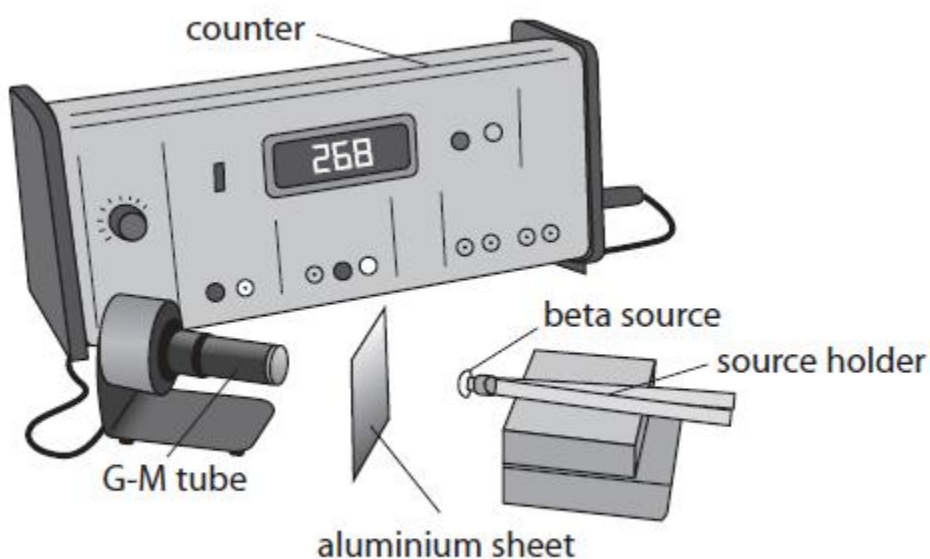


Figure 3

- (i) The aluminium sheet is taken away. The counter is reset to zero and then switched on again. A new count is taken for 1 minute.

Explain why the new count is greater than 268.

(2)

.....
.....
.....
.....

- (ii) The beta source is then also taken away. The counter is reset to zero and switched on again. A new count is taken for 1 minute.

Give a reason why there would now be a reading on the counter.

(1)

.....

.....
(iii) State the SI unit for the activity of a radioactive source.

(1)

.....
(Total for question = 4 marks)

Q2.

Figure 1 is a diagram of three atoms.

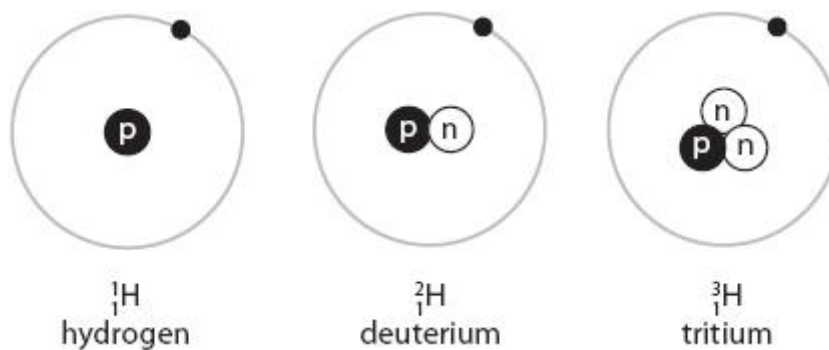


Figure 1

Give reasons why these atoms are isotopes.

(2)

.....

.....

.....

(Total for question = 2 marks)

Q3.

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 11 is the symbol for a nucleus of americium-241.



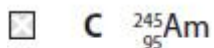
Figure 11

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)



(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 12 for americium-241 decaying into neptunium (Np).

(3)

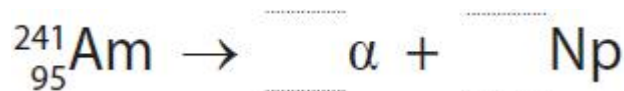


Figure 12

(Total for question = 5 marks)

Q4.

Other unstable isotopes emit alpha particles.

Which of these describes an alpha particle?

(1)

- A a hydrogen nucleus
- B a hydrogen atom
- C a helium nucleus
- D a helium atom

(Total for question = 1 mark)

Q5.

What is the approximate size of a hydrogen atom?

(1)

- A 10^{-3} m
- B 10^{-10} m
- C 10^{-19} m
- D 10^{-31} m

(Total for question = 1 mark)

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 () .

An electron has a charge of -1 .

The charge on an alpha particle is

(1)

- A -2
- B 0
- C $+1$
- D $+2$

(Total for question = 1 mark)

Q7.

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 () .

Nuclear fusion is a process that releases energy.

Which of these statements applies to a nuclear fusion reaction?

(1)

- A it emits daughter nuclei
- B it is a controlled chain reaction
- C it produces radioactive waste
- D it requires high temperature and pressure

(Total for question = 1 mark)

Q8.

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 .

(i) In a controlled chain reaction of uranium-235, which of these could cause a uranium-235 nucleus to undergo fission?

(1)

- A an alpha particle
- B a beta particle
- C a neutron
- D a proton

(ii) The kinetic energy of one of the particles released in a fission reaction is 1.2×10^{-11} J.

The mass of the particle is 1.4×10^{-25} kg.

Calculate the velocity of the particle.

(3)

velocity of the particle = m/s

(Total for question = 4 marks)

Q9.

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 9 represents a decay that can happen inside the nucleus of an atom.

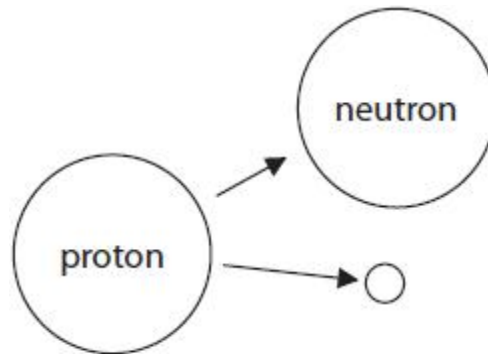


Figure 9

Which decay is represented in Figure 9?

(1)

- A alpha
- B beta minus
- C beta plus
- D gamma

(Total for question = 1 mark)

Q10.

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 .

Which of these describes isotopes of an element?

(1)

<input type="checkbox"/> A	same atomic number	different number of neutrons
<input type="checkbox"/> B	same atomic number	different number of protons
<input type="checkbox"/> C	same mass number	different number of neutrons
<input type="checkbox"/> D	same mass number	different number of protons

(Total for question = 1 mark)