

3 (a) Figure 3 shows the structure of an oxygen-14 atom.

(i) Complete the four labels on Figure 3.

(4)

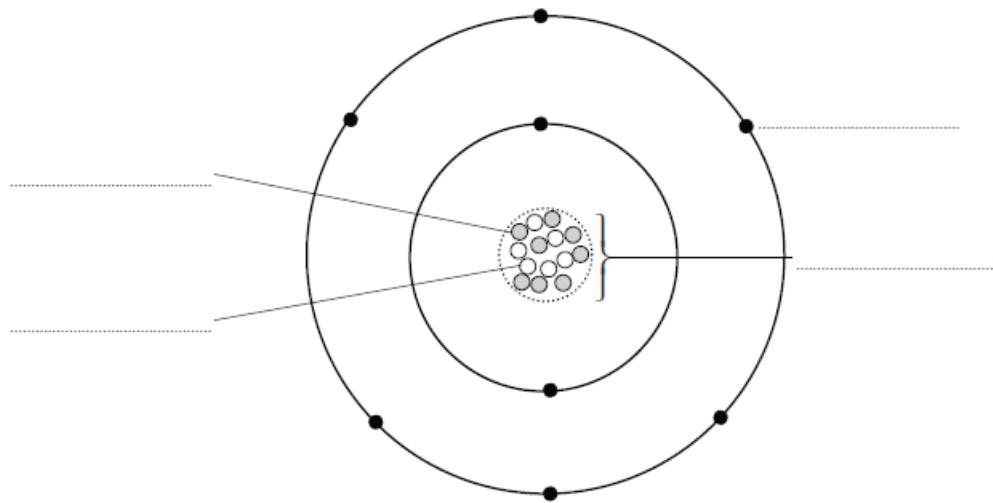


Figure 3

(ii) Which of these particles has a negative charge?

(1)

- A alpha particle
- B electron
- C neutron
- D nucleus

(iii) State the overall charge of the oxygen-14 atom.

(1)

(b) A teacher uses a Geiger-Müller tube and a counter to measure background radiation.

The reading on the counter tube is 34 counts per minute.

- (i) The teacher puts a source of beta radiation 15 cm in front of the same Geiger-Müller tube.

The reading on the counter tube is now 468 counts per minute.

Calculate how much radiation detected by the Geiger-Müller tube comes from the source of beta radiation.

(1)

..... counts per minute

- (ii) The teacher puts a thick sheet of aluminium between the source of beta radiation and the Geiger-Müller tube.

Estimate the reading on the counter tube.

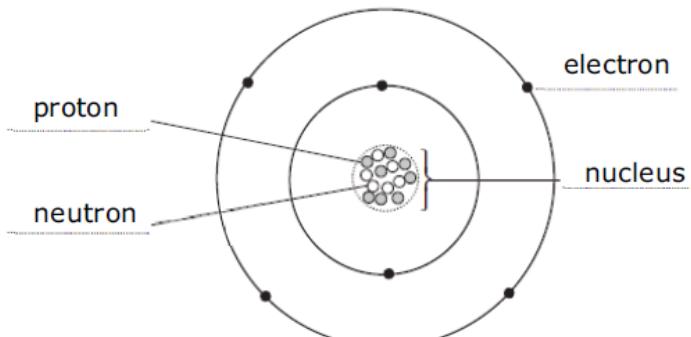
(1)

..... counts per minute

- (iii) Give a reason why the answer to (ii) is only an estimate.

(1)

(Total for Question 3 = 9 marks)

Question number	Answer	Mark
3(a)(i)	<p>One mark for each correct label (4)</p> 	(4)

Question number	Answer	Mark
3(a)(ii)	B	(1)

Question number	Answer	Mark
3(a)(iii)	zero/0/no charge	(1)

Question number	Answer	Mark
3(b)(i)	434	(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	34	allow 29 to 39	(1)

Question number	Answer	Additional guidance	Mark
3(b)(iii)	Radioactive decay is a random process	allow because background count changes every time	(1)