Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

(a) peer review

1

(b) it is ionising

ignore references to penetrating ability

1

(c) becquerel / Bq

1

(d) not all the radiation emitted (by the sample) is detected

1

(because) the radiation spreads out
or
(because) some radiation is absorbed before reaching the detector
or
(because) some of the radiation entering the detector is **not** detected

allow because the radiation is emitted in all directions

1

(e) alpha radiation

1

because the radiation is not detected beyond 5 cm
or
because alpha radiation cannot travel 10 cm (in air)
or
because beta **and** gamma radiation would be detected at 10 cm

dependent on MP1

allow because alpha radiation cannot travel more than a few cm (in air)

1

(f) 60 minutes is 4 half-lives

allow 15 minutes is 1 half-life

allow 1568 → 784 → 392 → 196 → 98

allow $\frac{1568}{98} = 2^4$

allow $\frac{98}{1568} = \frac{1}{2^4}$

1

30 minutes is 2 half-lives

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1

X = 392

1

(g) radioactive decay is a random process

1

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Q2.

(a) reverse the connections to the LED / battery

allow reverse the potential difference across the LED / diode

1

because an LED / diode only allows current through in one direction

allow LED / diode has a large resistance in the reverse direction

1

(b) 290 mA = 0.29 A

1

0.98 = V × 0.29

allow a correct substitution of an incorrectly / not converted current

1

or

$R = \frac{0.98}{0.29^2}$

allow R = 11.652…

ignore 0.98 = $(0.29)^2$ × R

allow a correct substitution of an incorrectly / not converted current

$V = \frac{0.98}{0.29}$

allow V = 11.65 × 0.29

1

V = 3.379…

allow a correct rearrangement using an incorrectly / not converted current

1

V = 3.4 (V)

allow a correct calculation using an incorrectly / not converted current

allow a correctly rounded answer to 2 sig figs consistent with their calculated value of V using numbers from the question

1

(c) electrons in the atom fall to a lower energy level

1

(d) 1.4 = Q × 200

1

$Q = \frac{1.4}{200}$

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1

$Q = 0.0070$ (C)

1

$0.0070 = I \times 2.8 \times 10^{-4}$

allow a correct substitution of their calculated value of Q

1

$I = \frac{0.0070}{2.8 \times 10^{-4}}$

allow a correct re-arrangement using their value of Q

1

$I = 25$ (A)

allow an answer consistent with their value of Q

1

OR

$1.4 = P \times 2.8 \times 10^{-4}$ (1)

$P = \frac{1.4}{2.8 \times 10^{-4}}$ (1)

$P = 5000$ (W) (1)

$5000 = 200 \times I$ (1)

allow a correct substitution of their calculated value of P

$I = \frac{5000}{200}$ (1)

allow a correct re-arrangement using their value of P

$I = 25$ (A) (1)

allow an answer consistent with their value of P

[14]

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