Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Mark Schemes

Q1.

(a) sensible scales

full use of y axis

1

completely accurate plotting

1

a smooth curve going through all bar one of the points

do not accept a dot-to-dot graph if two parts shown for curves accept the more correct

1

at least one line or a clear mark showing how to obtain the half life from the graph and obtaining between 13 and 15

at the bottom of the page cross or ticks in the order of the mark scheme

1

(b) (i) to let the beta particles get through

*accept must be there to let the radiation through **or** if thick they may be stopped*

1

*(ii) alpha particles would be stopped by the glass **or** cannot penetrate glass*

do not accept alphas are weak

1

*(c) (i) it will give more counts per minute for a small quantity **or** it does not last so long so may not be as dangerous*

accept answers in terms of 5 years assume it refers appropriately

1

*(ii) it will not be there long enough to act as a tracer **or** it could cause radiation damage as all its activity will be in the first place it enters the system*

accept answer in terms of 5 seconds

accept not there long enough to work assume it refers appropriately

1

[8]

Q2.

(a) (i) two protons

1

2 neutrons

if neither point gained allow 1 mark for helium nucleus

1

(ii) *electron*

1

(b) *neutron splits (to form proton and electron)*

1

[4]

Q3.

(a) (i) *beta and gamma (any order)*
for one mark

1

(ii) *gamma*
for one mark

1

(b) (i) *particles / atoms / molecules become charged / gain / lose electrons*
for one mark

1

(ii) *e.g. to kill cancer cells (allow any use of alpha, beta or gamma or X^- radiation)*
for one mark

1

(c) (i) *time taken for no. of atoms / no. of nuclei / mass of U238 / activity to halve – **not** radioactivity*
or
time taken for count rate to halve
for one mark

1

(ii) *atoms with unstable nuclei which emit radiation*
(not definition of isotope but isotope which is radioactive gets 1 mark)
for 1 mark each

2

(d) (i) *1 / 4 accept 25% or 0.25*
for one mark

1

(ii) *2 × half life or 2 × 4500 million years (independent of (i))*
gains 1 mark
but

9000 million years ecf only if answer to (i) is $\frac{1}{2}, \frac{1}{8}, \frac{1}{16},$ *etc.*
gains 2 marks

2

[10]