

Name of the Student: _____

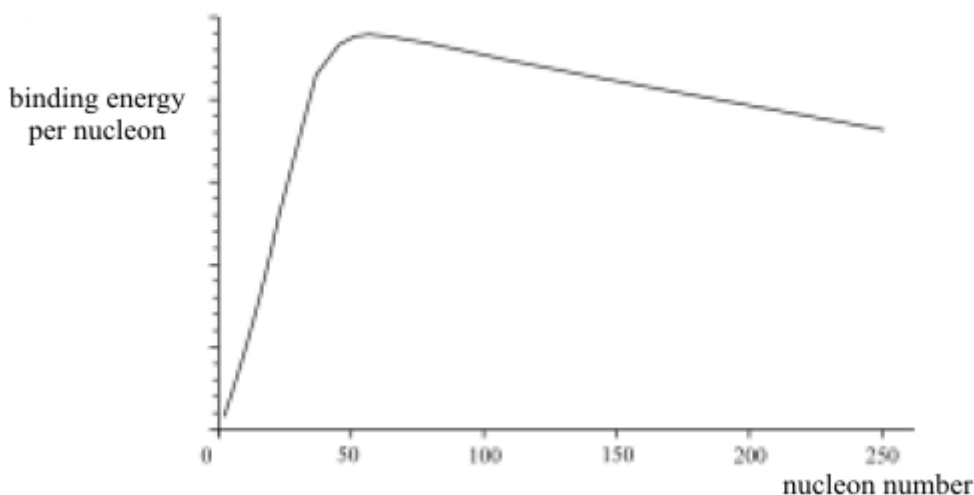
Max. Marks : 20 Marks

Time : 20 Minutes

Mark Schemes

Q1.

(a)



peak 8.7 (accept 8.0 – 9.2)

in MeV ✓

(or peak 1.4×10^{-12} accept $1.3 - 1.5 \times 10^{-12}$ in J ✓)

at nucleon number 50 – 60 ✓ accept 50 – 75

sharp rise from origin and moderate fall not below 2/3 of peak height ✓

4

(b) energy is released/made available when binding energy **per nucleon** is increased ✓

in fission a (large) nucleus splits and in fusion (small) nuclei join ✓

the most stable nuclei are at a peak

fusion occurs to the left of peak and fission to the right ✓

max 3

[7]

Q2.

(a) Background radiation ✓

Background count = 20 count/minute unit required ✓

Ignore any –ve sign for background count
Must be written to 2 sf

2

- (b) Correct line of best fit ✓

The line must be a straight line (as instructed), with approximately an equal number of points on either side of the line.

1

- (c) Triangle drawn with smallest side at least 8 cm ✓
(or 8 grid squares)

correct values read from graph ✓

gradient = $-0.00698 (\pm 0.00030) \text{ min}^{-1}$ ✓

must have –ve sign and must be to 2 or 3 sf ✓

Gradient must lie within limits stated. No ecf from incorrectly read values unless it falls within stated limits. No unit penalty.

3

- (d) Recognises gradient = $(-)\lambda$ or

Uses gradient for value of $\lambda = 7.0 (\pm 0.30) \times 10^{-3} \text{ minute}^{-1}$ ✓

$T_{1/2} = 99 \text{ minutes}$ to 2 or 3 sf ✓

For 1st mark accept evidence that value of gradient has been substituted into correct formula for half life. No penalty for missing –ve sign. Allow ecf from incorrect gradient value.

Unit penalty if half life has been calculated in different unit (to minutes stated in question)

2

- (e) Random ✓

1

- (f) (i) Uncertainty = $(\pm \sqrt{429}) = \pm 21$

No sf penalty ✓

Details of calculation not required. Marks can be awarded for correct numerical answers. Also no penalty for quoting uncertainty or % uncertainty without '±'.

1

- (ii) % uncertainty = $\pm 4.9\%$ ✓

No sf penalty. (Note that % uncertainty in total count is same as % uncertainty in corresponding count rate.)

Accept also 4.8% (number achieved keeping all sig figs in calculator)

No penalty for omitting % or '±'.

No sf penalty

1

- (iii) % uncertainty for 84 counts is $\pm 10.9\%$ ✓

Taking data over larger time period / larger total count will have smaller percentage uncertainty. ✓

Accept $\pm 11\%$

No penalty for omission of ± sign. No sf penalty for estimated % uncertainties.

2

[13]