Radioactivity 2

Name & Set

1 An atom can be represented by $^{226}_{88}Ra$

(i) What information about the nucleus do the numbers 226 and 88 give?

_____

_____ [2]

(ii) What further information about the nucleus can be obtained from these numbers?

_____ [1]

(iii) The radium is thought to be radioactive emitting only alpha-particles and gamma-rays. How could you test the truth of these claims?

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_____

_____

_____

_____ [4]

(iii) What would be the composition of the resulting nucleus if this isotope of radium decayed by emitting an alpha-particle?

_____ [2]

2 The following symbols represent five nuclides (nuclei):

$$^{58}_{29}A \quad ^{54}_{27}B \quad ^{59}_{29}C \quad ^{58}_{30}D \quad ^{59}_{30}E$$

(i) Which nuclides are isotopes of one another?

_____ [2]

(ii) Which nuclide could be produced from which other by the emission of an α-particle?

_____ [2]

(iii) Which nuclide could be produced from which other by the emission of a ß-particle?

_____ [2]

(iv) One nuclide emits γ rays. Is it possible to determine which one from the above information?

_____ [1]

(v) Which nuclide possesses most neutrons? How many neutrons?

_____ [2]

4 (a) Alpha particles, beta particles, gamma radiation and X-rays are all said to be ionising radiation. What does this mean?

_____

_____

_____ [2]

(b) Describe two methods by which the presence of ionising radiation may be detected. In each case describe the principle on which the method works.

(i) _____

_____

_____ [2]

(ii) _____

_____

_____ [2]

5 A student arranged a Geiger-Müller tube, connected to a rate meter, close to a radioactive source and then placed sheets of different materials as absorbers between the source and the tube. Three readings were taken at 10-second intervals for each sheet and the results tabulated below. Finally the student put the source away and determined the background count. Over a 30 second period the rate meter registered a total of 1350 counts. The results of the rate meter readings are in counts per minute.

Absorber material	**1st trial**	**2nd trial**	**3rd trial**
Air	120	110	130
Paper	100	120	110
Cardboard	130	130	100
Aluminium (0.5 mm)	110	120	110
Aluminium (5 mm)	50	60	40
Lead (5 mm thick)	40	50	50
Lead (5 cm thick)	50	40	50

Use the data to deduce the nature of the radiation emitted by the source. Give reasons for your choice.

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_____

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_____

_____ [4]