

Physics unit 4 homework – Atomic structure

For each of the questions below: -

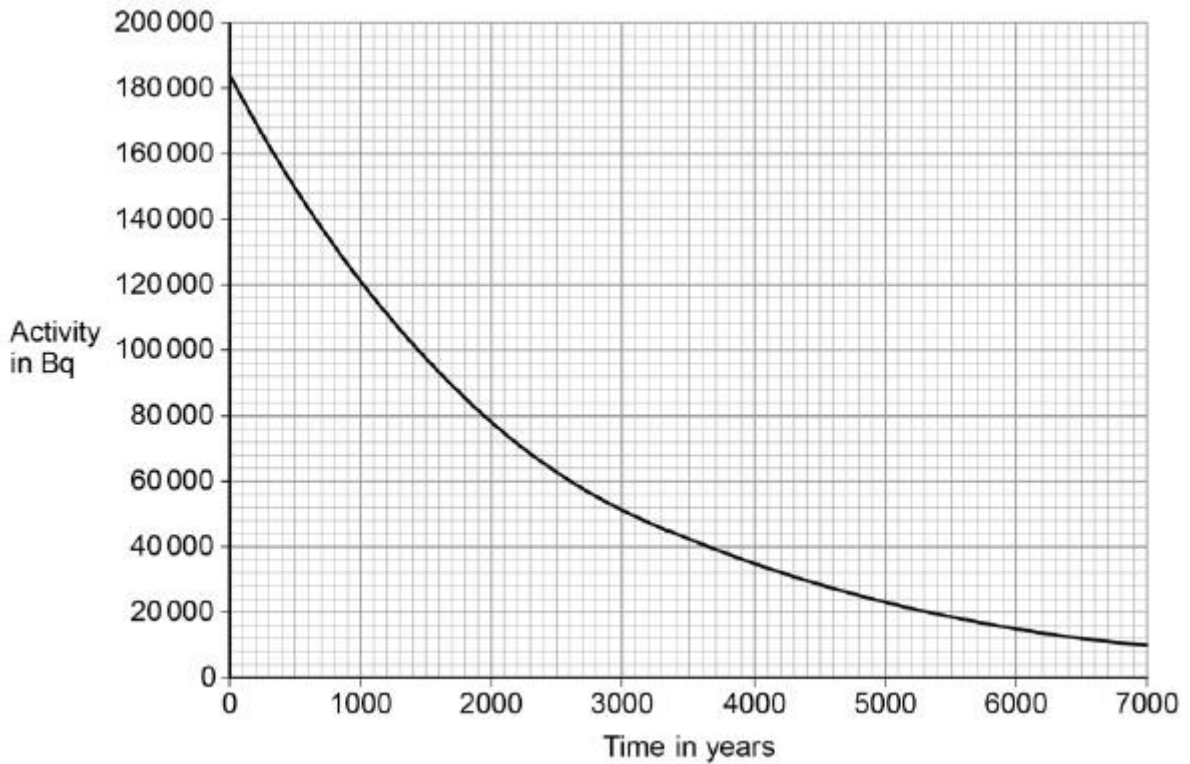
Highlight the command word if there is one & annotate what the command word means. - Answer the question!

Q1. Figure 1 shows the label from a box containing radium-226

Radium-226 emits α , β and γ radiation.

(a) **Figure 1** shows how the activity of the radium-226 will change.

Figure 1



Determine the half-life of radium-226.

Show your working on **Figure 2**.

Half-life = _____ years

(2)

(b) Radium-226 was discovered by Marie Curie in 1898.

The notebooks she used were contaminated with radium-226 and are still hazardous.

Explain why the notebooks are still hazardous.

(2)

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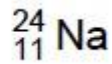
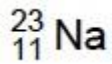
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- (c) Explain how the properties of α , β and γ radiation affect the level of the hazard at different distances.

(6)

Q2 Some street lamps contain sodium.

Below are two isotopes of sodium.



- (a) What are isotopes?

(2)

- (b) How many protons and neutrons are in a nucleus of $^{23}_{11}\text{Na}$?

Number of protons = _____

Number of neutrons = _____

(2)

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Q3 The arrangement of electrons in atoms can change.

- (a) Describe what might happen to make an electron move from a lower energy level to a higher energy level in a neon atom.

(1)

- (b) Describe what happens when an electron moves from a higher to a lower energy level in a neon atom.

(2)

- (c) The table shows information about radiation doses.

	Radiation dose in millisieverts
Mean annual dose from natural sources	2.7
Mean dose from one aircraft flight	3.0×10^{-2}

The mean annual dose a person receives from natural sources is greater than the mean dose from one aircraft flight.

Calculate how many times greater.

Number of times greater = _____

(2)

- (d) X-rays can be harmful.

Suggest why some people think X-rays are more dangerous than they really are.

(1)

- (e) Ionising radiation can be used to treat patients in hospital.

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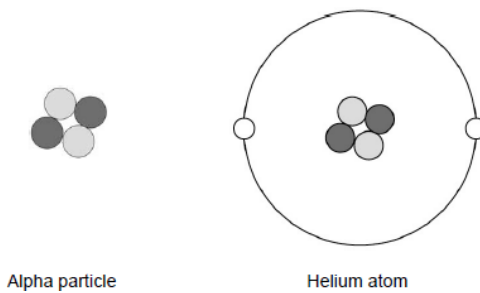
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People working in hospitals must limit their exposure to ionising radiation.

Explain how the use of ionising radiation in hospitals can be both useful **and** harmful.

(6)

Q4 The figure below is a diagram of an alpha particle and a helium atom.



(a) What is the approximate size of a helium atom?

(1)

(b) A helium atom is much larger than an alpha particle.

Give **one** other difference between a helium atom and an alpha particle.

(1)