

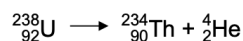
Q1. (2018)

When radioactive isotopes in the Earth's crust decay they release energy.

The decay causes the heating of rocks in the crust.

0 5 . 4 **Figure 8** shows the decay of uranium-238 (U-238) into thorium-234 (Th-234).

Figure 8



Complete **Table 2** to show the number of neutrons and protons in the nuclei.

[2 marks]

Table 2

Isotope	Number of neutrons	Number of protons
uranium-238	146	
thorium-234		90

Q2. (2018)

0 6 . 2 Explain why the total positive charge in every atom of an element is always the same. **[2 marks]**

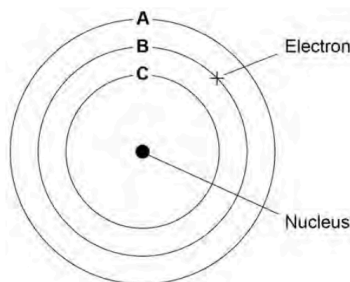
Q3. (2019)

0 3 In an experiment, a beam of alpha particles was directed at a thin sheet of gold foil.

0 3 . 3 Further experiments showed that gold nuclei are surrounded by electrons in different energy levels.

Figure 4 shows three of the energy levels around the nucleus of a gold atom.

Figure 4



The electron in energy level **B** absorbs electromagnetic radiation.

Which energy level will the electron be in after it has absorbed the electromagnetic radiation?

[1 mark]

Tick (✓) **one** box.

A ☐
B ☐
C ☐

Q4. (2019)

0 4

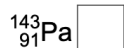
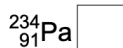
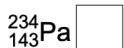
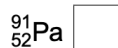
Protactinium (Pa) is radioactive.

0 4 . 1

An atom of one isotope of protactinium contains 91 protons and 143 neutrons.

What is the correct symbol for this atom?

[1 mark]

Tick (✓) **one** box.

Q5. (2021)

0 6

A radioactive source emits alpha, beta and gamma radiation.

0 6 . 1

An alpha particle is the same as a helium nucleus.

How many times bigger is the radius of a helium atom than the radius of an alpha particle?

[1 mark]

Tick (✓) **one** box.

Less than 100 times bigger

☐

Exactly 5000 times bigger

☐

More than 10 000 times bigger

☐

Q6. (2023)

0 1

A scientist investigated the radiation emitted by different radioactive isotopes.

The scientist had a sample of polonium-210.

The radiation emitted by polonium-210 can be represented by the symbol ${}^4_2\text{He}$.

0 1 . 2

How many protons are there in a particle of radiation represented by ${}^4_2\text{He}$?

[1 mark]

Tick (✓) **one** box.2 ☐4 ☐6 ☐8 ☐

Q7. (2024)

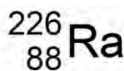
0 3

Some people used to think that radioactive substances had health benefits.

100 years ago, a company made toothpaste containing the radioactive isotopes radium-228 and radium-226.

Figure 3 shows the symbols for these isotopes.

Figure 3



03.1 How are atoms of radium-228 different from atoms of radium-226?

[1 mark]

Tick (✓) **one** box.

Radium-228 atoms have one more neutron and one more proton.

☐

Radium-228 atoms have two more neutrons and two more protons.

☐

Radium-228 atoms have two more neutrons.

☐

Radium-228 atoms have two more protons.

☐

Q8. (2024)

07 Last century, scientists used evidence from the alpha particle scattering experiment to develop a new model of the atom.

In the experiment, alpha particles were directed towards a piece of gold foil.

07.2 A gold atom has the symbol $^{197}_{79}\text{Au}$.

How many neutrons are there in this gold atom?

[1 mark]