

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

Read this statement from a website.

Immediately after the 'big bang', at the start of the Universe, there were only atoms of the element hydrogen (H).

Now there are over one hundred elements.
Scientists think that all the elements on Earth are also present throughout the Universe.

- (a) Explain how atoms of the element (He) are formed in a star.

(2)

- (b) Explain how atoms of very heavy elements, such as gold (Au), were formed.

(2)

- (c) Scientists have only examined a tiny fraction of the Universe.

What is the basis for scientists thinking that the elements found on Earth are present throughout the Universe?

(1)

(Total 5 marks)

Q2.

- (a) Nuclear fuels and the wind are two of the energy sources used to generate electricity in the UK.

Explain the advantages of using energy from nuclear fuels to generate electricity rather than using energy from the wind.

Include in your answer a brief description of the process used to generate electricity from nuclear fuels.

(4)

- (b) In the UK, most electricity is generated in power stations that emit carbon dioxide into the atmosphere. The impact of these power stations on the environment could be reduced by the increased use of 'carbon capture' technology.

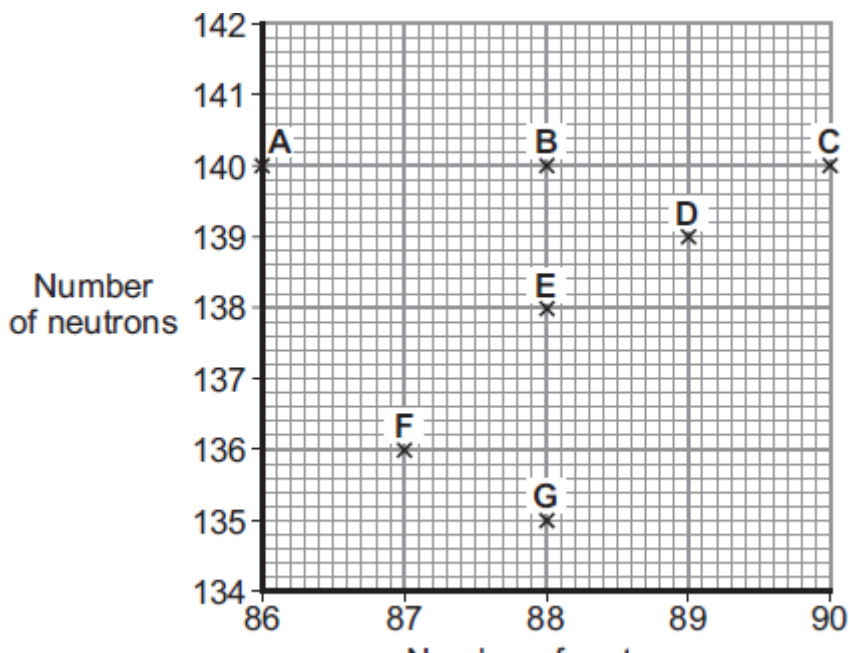
Describe how 'carbon capture' would prevent the build-up of carbon dioxide in the atmosphere.

(2)

(Total 6 marks)

Q3.

- (a) The chart gives the number of protons and neutrons within the nuclei of 7 different atoms, **A – G**.



Which of these atoms are isotopes of the same element?

Give a reason for your answer.

(2)

- (b) Radium-226 is a radioactive isotope that decays into radon gas by emitting alpha particles.

The decay can be represented by the equation below.



- (i) Complete the equation by writing the correct number in each of the boxes.

(2)

- (ii) A sample of radium-226 has a count rate of 400 counts per second.
The half-life of radium-226 is 1600 years.

How long will it be before the count rate has fallen to 50 counts per second?

Show clearly how you work out your answer.

Length of time = _____ years

(2)

- (c) In 1927, a group of women who had been employed to paint watch faces with a luminous paint sued their former employer over the illnesses caused by the paint. The women had been told that the paint, which contained radium, was harmless.

The company owners and the scientists working for the company knew that radium was harmful and took precautions to protect themselves from the radiation. The women were given no protection.

What important issue did the treatment of the women by the company owners and scientists raise?

Draw a ring around your answer.

economic

environmental

ethical

social

Give a reason for your answer.

(2)

- (d) In the 1920s, many people, including doctors, thought that radium could be used as a treatment for a wide range of illnesses. Medical records that suggested radium could be harmful were generally ignored. When some of the women who had used the luminous paint died, their deaths were not blamed on radium.

Suggest a reason why the evidence suggesting that radium was harmful was generally ignored.

(1)

(Total 9 marks)