Chapter 3·2 & 3·3 Exam Q Year 11

Question 1

(4 marks)

Using the lithium-7 atom as the example, draw a labelled diagram to represent the model of the atom.

Question 2

(3 marks)

There are at least 37 isotopes of gold, but only one is stable. The stable isotope of gold is written as $^{197}_{79}\mathrm{Au}$.

(a) Determine how many neutrons the stable isotope of gold contains. (1 mark)

(b) Compare what occurs to an isotope that is not 'stable' with an isotope that is 'stable'. (2 marks)

Question 3

(3 marks)

Draw and label a diagram to show your understanding of the currently accepted structure of a helium-4 atom.

Question 4

(4 marks)

Nuclear fusion within the Sun is the Earth's main source of energy. In the core of the Sun, the temperature is more than 15 million degrees Celsius. The Sun's powerful gravity pulls all of the mass together creating a very high pressure. These two factors combine to force hydrogen atoms to come together in a nuclear fusion reaction. Through several steps, helium-3 nuclei are created. The nuclear equation below shows two of these helium-3 nuclei combining to form helium-4 (an alpha particle) and two protons.

$$^{3}_{2}\mathrm{He} + {}^{3}_{2}\mathrm{He} \rightarrow {}^{4}_{2}\mathrm{He} + 2\,{}^{1}_{1}\mathrm{H}$$

Using the information below and your Formulae and Data booklet, calculate the energy released in joules during this reaction.

Mass $^{3}_{2}\mathrm{He} = 5.01 \times 10^{-27}$ kg