Answer ALL questions.

1 There are different types of ionising radiation.

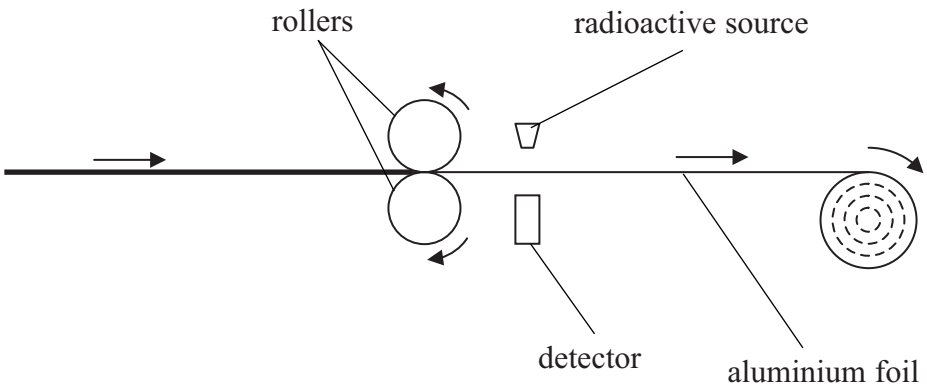
(a) Complete the table to show the properties of each type.

(2)

Type of ionising radiation	Charge	Emitted by
alpha particle		unstable nuclei
beta particle	– 1	unstable nuclei
gamma ray	0	

(b) The diagram shows a machine which makes aluminium foil.

The machine uses a radioactive source to measure the thickness of the foil.



The radioactive source emits beta particles.

The output from the detector indicates the thickness of the foil.

Explain why beta particles are used, rather than alpha particles or gamma rays.

(3)

(c) The radioactive source contains strontium-90.

A strontium-90 nucleus emits a beta (β^-) particle.

(i) Complete the equation to show how strontium-90 decays.

(1)

$$^{90}_{38}\text{Sr} \longrightarrow \text{.....}\,\text{Y} + {}^{0}_{-1}\beta^-$$

(ii) Which of these describes what happens to the strontium-90 nucleus when it emits a beta (β^-) particle?

(1)

☒ **A** the number of protons stays the same

☒ **B** the number of protons increases

☒ **C** the number of neutrons stays the same

☒ **D** the number of neutrons increases

(Total for Question 1 = 7 marks)