6 Nuclei of an isotope of samarium (Sm) each contain 62 protons and 85 neutrons.

(a) State the nuclide notation in the form ${}^{A}_{Z}X$ for this isotope of samarium.

[1]

(b) This isotope of samarium is radioactive and decays by emitting particles. Gamma-radiation is **not** emitted. The energy spectrum of the emitted particles is shown in Fig. 6.1.

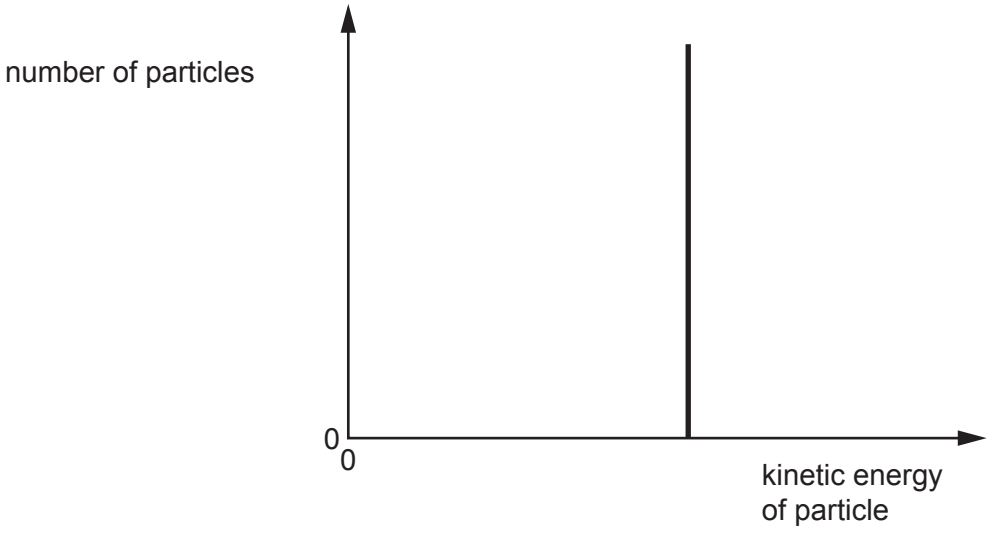

Fig. 6.1

(i) Explain how Fig. 6.1 shows that this isotope of samarium emits α-particles and does **not** emit β-particles.

.....

.....

.....

..... [2]

(ii) This isotope of samarium decays to an isotope of neodymium (Nd).

Give the radioactive decay equation for this decay. Include the nucleon and proton numbers of **all** the particles involved.

[2]

(c) A baryon is composed of three quarks which all have different flavours. The baryon has a charge of 0.

Two of the quarks in the baryon are an up quark and a bottom quark.

(i) Determine, in terms of the elementary charge *e*, the charge on the third quark in the baryon.

charge = ...*e* [2]

(ii) State a possible flavour for the third quark in the baryon.

..... [1]

[Total: 8]