**7** Strontium-90 decays with the emission of a β-particle to form Yttrium-90. The reaction is represented by the equation

$$^{90}_{38}\text{Sr} \rightarrow {}^{90}_{39}\text{Y} + {}^{0}_{-1}\text{e} + 0.55\ \text{MeV}$$

The half-life of Strontium-90 is 27.7 years

**(a)** Define *half-life.*

…….

…….. [1]

**(b)** Suggest, with a reason, which nuclide $^{90}_{38}\text{Sr}$ or $^{90}_{39}\text{Y}$ has a greater binding energy.

…….

…….

…….

…….

…….. [3]

**(c)** At the time of purchase of a Strontium-90 source, the activity is $3.7 \times 10^6$ Bq.

**(i)** Calculate, for this sample of strontium,

**1.** the initial number of atoms,

initial number = ..... [2]

**2.** the initial mass.

initial mass = .....kg [2]

**(ii)** Determine $\frac{A}{A_o}$, where $A$ is the activity of the sample 5.0 years after purchase and $A_o$ is the initial activity.

$\frac{A}{A_o}$ = ..... [2]

[Total: 10]