
Activity 1.3

Question 1

This question is about atomic particles and radioactivity.

- (a) Name the type of radioactive decay that is the most ionizing.

_____ [1]

- (b) (i) An atom of radium (Ra) of mass number 226 and atomic number 88 decays by alpha emission to radon (Rn). Write the nuclear reaction for this decay in the space provided.

_____ [2]

- (ii) A sample of iodine-128 has a half-life of 25 minutes. Define the term half-life.

_____ [2]

- (iii) The sample of iodine-128 has a mass of 1.4 kg. Estimate how much of it is left in grams after 1.5 hours have passed.

_____ [2]

- (iv) Why would iodine-128 be suitable as a medical tracer?

_____ [1]

- (c) Carbon dating is another use for radioactive isotopes. Define isotope and state the isotope of carbon that is used for this purpose?

_____ [2]

TOTAL MARKS [10]

Question 2

- (a) $^{238}_{92}\text{U}$, a radioactive isotope of uranium, decays by α -particle emission and has a half-life of 4.5×10^9 years. It decays into a radioactive isotope of thorium (Th). Thorium itself is radioactive, decaying by β -particle emission to protactinium (Pa), and has a half-life of 24 days.

- (i) Define the term half-life.

_____ [2]

- (ii) Given 100 grams of the two isotopes, which one will have the larger mass after 2 years.

Explain your answer.

_____ [2]

- (b) Give one property of an alpha (α)- and one property of a beta (β)-particle.

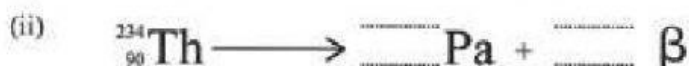
α - _____

β - _____ [2]

- (c) Give one use of β -particles.

_____ [1]

- (f) Copy and complete the radioactive decay equations below for uranium decaying to thorium and thorium decaying to protactinium.



[3]

TOTAL MARKS [10]