Atoms and Radioactivity

Atomic physics · 4 questions · step-by-step answers at the end

Name: Date: Score: / 4

USEFUL EQUATIONS

alpha: $A - 4$, $Z - 2$ beta: A unchanged, $Z + 1$ gamma: A and Z unchanged

Questions

Show your working in the space under each question.

1. Carbon-14 (Z = 6) decays by beta emission. What does it become?

2. Radium-226 (Z = 88) decays by alpha emission. What are the mass and atomic numbers of the new nucleus?

3. How many neutrons are in a nucleus of carbon-14 (Z = 6)?

4. Why is an alpha source more dangerous inside the body than outside it?

Step-by-step answers

Atoms and Radioactivity

1. A stays 14 and Z rises to 7: **nitrogen-14**.

2. 1. An alpha particle carries away 4 nucleons, including 2 protons.
2. A = 226 − 4 = **222**. Z = 88 − 2 = **86**.
3. Element 86 is radon: the product is radon-222.

Answer: A = 222, Z = 86 (radon-222)

3. 14 − 6 = **8**.

4. Outside, the skin stops it. Inside, it is **strongly ionising** and all its energy is absorbed by nearby cells.