7.1 Atomic structure and radiation

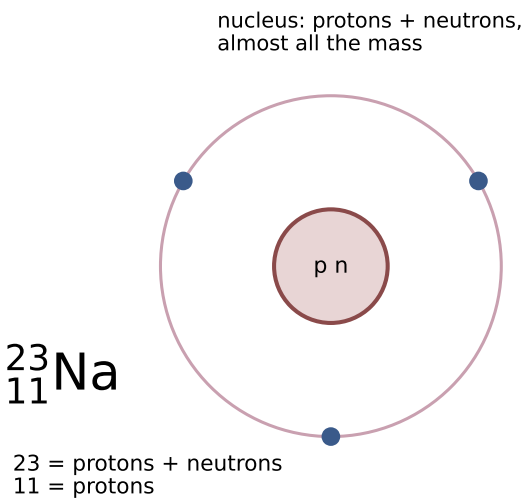
Name: _____ Class: _____ Date: _____ **Total: 14 marks**

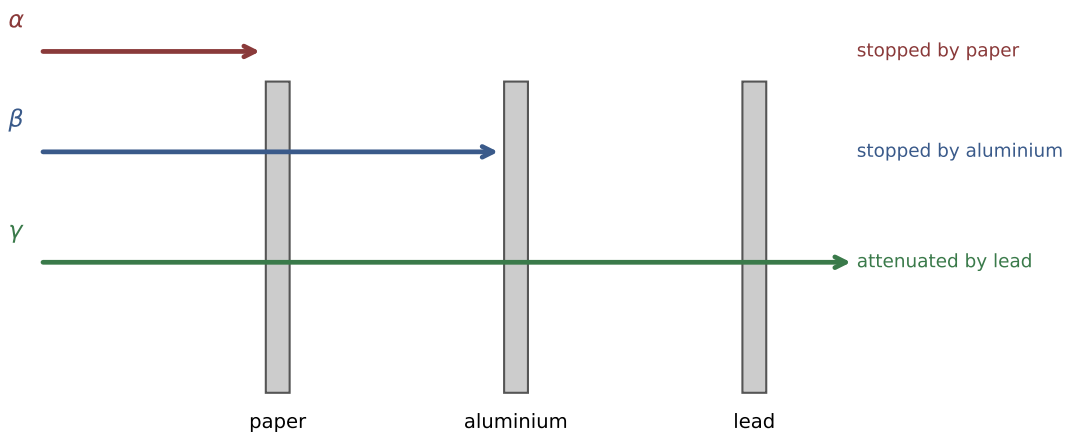
Objective

Cover atomic structure and ionising radiation (3.7.1–3.7.2): the nuclear model with alpha-scattering evidence, particle properties and notation, the three radiations with penetration and ionisation, balanced equations, background radiation, (P) half-life and contamination versus irradiation. Original OxfordAQA practice.

1 Key knowledge and worked examples

■ Notation, balance and penetration





A falls by 4 and Z by 2 in alpha decay; A stays and Z rises by 1 in beta decay.

2 Practice

2.1 Give the relative mass and charge of a neutron. [2]

2.2 In $^{40}_{20}Ca$, how many neutrons? [1]

2.3 Name the radiation with the strongest ionising power. [1]

2.4 Which radiation passes through aluminium? [1]

2.5 (P) Define half-life. [1]

3 Exam-style questions

3.1 Describe how alpha scattering by gold foil led to the nuclear model of the atom. [3]

3.2 Balance the beta decay of potassium-40: ${}^{40}_{19}K \rightarrow ? + {}^{0}_{-1}e$. [2]

3.3 (P) A source's count rate falls from 800 to 200 counts/min in 12 hours. Determine the half-life. [3]