

Nuclear physics

OxfordAQA International GCSE Physics 9203 nuclear physics full package

1. Nuclear physics

Nuclear physics

The nucleus is a millionth of the atom yet holds nearly all its mass — and unstable nuclei pour out energy as radiation, fission fragments, or the fusion that lights the stars

OxfordAQA's seventh topic covers the nuclear model, the three radiations, half-life, contamination versus irradiation, reactors and (P) fusion

2. Atomic structure

Atomic structure

An atom is about 10^{-10} m across: a tiny positive nucleus (protons and neutrons, nearly all the mass) with electrons around it — Rutherford's alpha-scattering evidence for the concentrated nucleus

Proton mass 1 charge +1; neutron mass 1 charge 0; electron charge -1 , negligible mass

3. Ionising radiation from the nucleus

Ionising radiation from the nucleus

Unstable nuclei decay randomly, unaffected by chemistry or physics, emitting:

Radiation	Nature	Ionising	Range in air		
alpha	$2p + 2n$ (helium nucleus)	strongest	a few cm	beta-minus	fast electron (neutron $\rightarrow$ proton)
gamma	electromagnetic wave	weakest	metres		

4. Nuclear fission and (P) fusion

Nuclear fission and (P) fusion

Fission splits a large unstable nucleus: U-235 or Pu-239 absorbs a neutron, splits into two smaller nuclei with 2–3 neutrons and far more energy than any chemical reaction

Neutrons striking further nuclei give a chain reaction; in a reactor control rods absorb neutrons to hold one fission per neutron

Check yourself

Check yourself

Work each checklist line against the worked examples named in the handout.

Redo any line you cannot close without the handout open.