
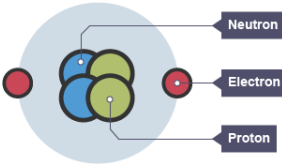


Section 1: Key Terms	
1 Atom	The smallest part of an element that can exist. All substances are made of atoms. No overall electrical charge. Very small , radius of 0.1nm.
2 Element	An element contains only one type of atom . Found on the Periodic Table. There are about 100 elements.
3 Isotope	An atom of the same element with different numbers of neutrons .
4 Radioactive decay	When an unstable nucleus changes to become more stable and gives out radiation. Random .
5 Activity	The rate at which decay occurs . Measured in becquerels (Bq) .
6 Count rate	Number of decays recorded each second by a Geiger-Muller tube.
7 Half life	The time it takes for the number of nuclei of the isotope in a sample to halve Or, The time it takes for the count rate (or activity) from a sample containing the isotope to fall to half its initial level .
8 Contamination	The unwanted presence of materials containing radioactive atoms e.g. within liquids, with the body/ on the skin.
9 Irradiation	When an object is exposed to radiation . The object does not become radioactive itself.
10 Ionisation	Radiation can ionize by removing electrons from atoms to form ions . If this happens in DNA it could lead to a mutation that causes cancer .
11 Peer review	The checking of scientific results by other scientific experts .

Section 2: Development of Atomic Model

12 Plum Pudding		The plum pudding model shows that the atom is a ball of positive charge with negative electrons embedded in it. Was incorrect .
13 Nuclear Model		Rutherford's scattering experiment found a central area of positive charge. The nuclear model has a positive nucleus and electrons in shells . Later, neutrons were discovered and included in the nucleus.

Section 3: Properties of Sub-Atomic Particles

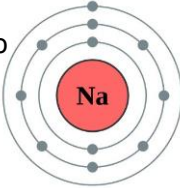
Sub-atomic particle	Mass	Charge	Position in Atom
14 Proton	1	+1	Nucleus
15 Neutron	1	0	Nucleus
16 Electron	Very small	-1	Orbiting in shells

17 **Mass number** – the total number of **protons** and **neutrons**

18 **Atomic number** – the **number of protons** (the number of electrons is the same in an atom)

19 **Energy levels:**
Absorption of radiation may lead to electrons moving further from the nucleus (higher energy level).
Emission of radiation may lead to electrons moving closer to the nucleus (lower energy level).

$^{23}_{11}\text{Na}$



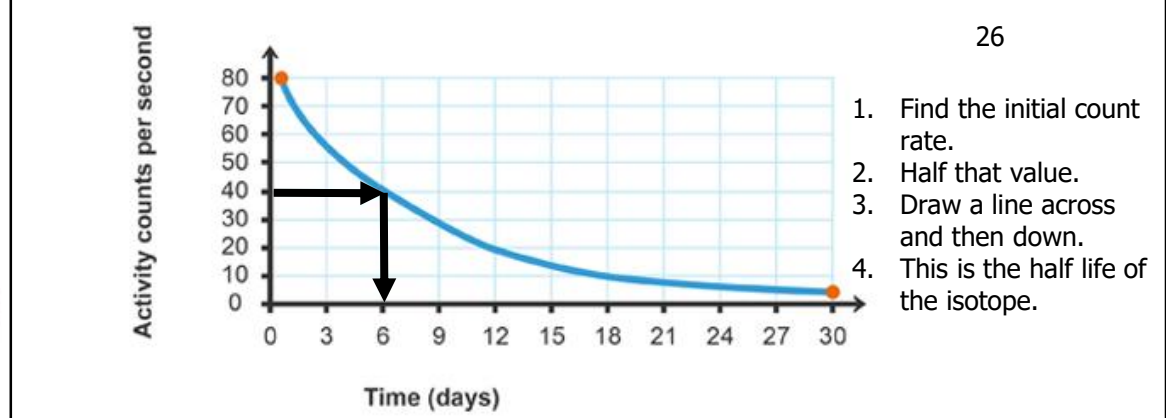
Section 4: Nuclear Radiation

Radiation	Range in air	Absorbed by	Ionizing Power	Product emitted when nuclei decays
20 Alpha	Short – up to 5cm	Paper and skin	Very High	2 protons and 2 neutrons
21 Beta	Medium – about 1m	About 5mm of aluminium .	Medium	Electron
22 Gamma	Unlimited – spreads out in air from the source	Several centimetres of lead .	Low	Electromagnetic wave

Section 5: Nuclear Decay Equations

	$^{219}_{86}\text{Rn} \rightarrow ^{215}_{84}\text{Po} + ^4_2\text{He}$
23 Alpha decay	In alpha decay a helium nucleus (2 protons and 2 neutrons) is emitted. The new element formed has: <ul style="list-style-type: none">- A mass number that has decreased by 4.- An atomic number that has decreased by 2.
	$^{14}_6\text{C} \rightarrow ^{14}_7\text{N} + ^0_{-1}\text{e}$
24 Beta decay	In beta decay a neutron turns into a proton. An electron is emitted. The new element formed has: <ul style="list-style-type: none">- A mass number that stays the same.- An atomic number increases by 1.
25 Gamma ray	There are no changes to the nucleus when gamma rays are emitted.

Section 6: Finding Half Life



Physics 4: Atomic Structure <u>Physics only</u>	