Atomic structure and radioactivity

Answers

GCSE science knowledge recall

This topic online

Q	Answer	Remember
1	1×10^{-10} m	About a tenth of a billionth of a metre. The nucleus is around 10 000 times smaller still.
2	protons and neutrons	Almost all the mass of the atom sits in the tiny nucleus.
3	-1	Proton +1, neutron 0, electron -1. Equal numbers of protons and electrons make an atom neutral.
4	further from the nucleus	Absorbing energy lifts an electron up; it emits radiation when it drops back down.
5	atomic number	The atomic number decides which element it is.
6	mass number	Mass number take atomic number gives the number of neutrons.
7	isotopes	Same protons, same element, same chemistry - only the mass is different.
8	12	23 - 11 = 12. This is sodium.
9	positive ion	Fewer electrons than protons leaves an overall positive charge.
10	electron	The plum pudding model pictured negative electrons dotted through a ball of positive charge.
11	alpha particles	Most went straight through, so the atom is mostly empty space; a few bounced back off a small, dense, positive centre.
12	Bohr	His calculations matched what was seen in experiments, so the idea was accepted.
13	Chadwick	The neutron has no charge, so it was hard to detect - it came last.
14	activity	Activity is measured in becquerels (Bq): one decay per second.
15	becquerel	Named after Henri Becquerel, who discovered radioactivity.
16	alpha	It is the same as a helium nucleus - big, slow and strongly ionising.
17	the nucleus	A neutron turns into a proton and an electron; the electron shoots out of the nucleus.
18	alpha	Most ionising, least penetrating - stopped by paper or a few cm of air.
19	gamma	Gamma is an electromagnetic wave with no mass or charge, so it is weakly ionising and very penetrating.
20	4	Two protons plus two neutrons leave, so mass number drops by 4 and atomic number by 2.

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Q	Answer	Remember
21	up by 1	A neutron becomes a proton, so there is one more proton but the mass number is unchanged.
22	half-life	It is also the time for the count rate from the sample to fall to half.
23	100	6 hours is 3 half-lives: 800 → 400 → 200 → 100.
24	3/4	A quarter are left, so three quarters have decayed - watch which one the question asks for.
25	Contamination is when radioactive atoms get onto or into an object, while irradiation is when an object is exposed to radiation from an outside source without becoming radioactive.	Contamination carries on after you leave; irradiation stops when you move away from the source.
26	background radiation	Rocks, cosmic rays from space, medical scans and fallout all add to it.
27	sievert	Doses are tiny, so they are usually quoted in millisieverts (mSv).
28	Gamma is weakly ionising so does less harm to cells, and it is penetrating enough to pass out of the body to be detected.	A short half-life is also wanted so the patient is not exposed for long.
29	nuclear fission	It is started by absorbing a neutron, and gives out more neutrons that can cause a chain reaction.
30	nuclear fusion	Fusion = joining. Some mass is converted to energy, which is how the Sun shines.

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