



Knowledge

1. Nucleus
2. JJ Thomson
3. Alpha particles
4. Absorbing EM radiation
5. Emitting EM radiation
6. Radiation that can cause other materials to become ions – e.g to lose electrons
7. Alpha
8. Gamma
9. GM tube
10. It decreases
11. Irradiation , contamination

11.

Type of nuclear radiation	What it is	Distance it can travel	How the nucleus is changed when it is emitted	Stopped by
Alpha	2 neutrons and 2 protons (a helium nucleus)	cm	Proton number decreases by 2, mass number decreases by 4	paper
Beta	A fast moving electron	A few metres	Proton number increases, mass number stays the same	aluminium
Gamma	An EM wave	many metres	Nucleus stays the same	Thick lead or concrete

Application

1. The atom may have emitted EM radiation (eg gamma) causing the electrons to move closer to the nucleus
2. The plum pudding and nuclear model both state that the atom is made of positive charge and negative electrons. However, in the plum pudding model, the positive charge was a 'cloud' of positivity and the electrons were randomly scattered within it. In the nuclear model, the positive charge is in the nucleus, in individual particles called protons, and the electrons orbit in shells. The nuclear model also has neutrons and the plum pudding model does not as they hadn't been discovered then.

3.

Observation	What this told him about the atom
Most alpha particles went straight through the atom	The atom was mostly empty space
Some were deflected off course	There was a positive charge that was very small
A very few came straight back	The positive charge was very small and

4. During Beta decay, a neutron turns into a proton and an electron. The electron is fired out and the proton stays in the nucleus.

5. Half life is the time taken for the number of radioactive nuclei to halve, or for the count rate to drop to half its initial value.

6. 2.6 days

Extend

7. Alpha particles are not very dangerous outside the body because they cannot travel very far and, even if they did reach the body, are not very penetrating, so would not get through the skin. Inside the body, however, they are very ionising and cannot get out, so they would cause cell and tissue damage.

8. Alpha decay, because the proton number has decreased by 2 and the mass number by 4.