

Knowledge



1. Atomic mass
2. Atomic number (proton number)
3. Alpha particles

Observation	Explanation	What this told him about the atom
Most alpha particles went straight through the gold leaf	The alpha particles had been able to pass through the atoms	most of the atom was empty space
A few were deflected by a large angle	The alpha particles had passed close to something that had pushed them off course – but it must be very small for it to only happen to a small number of them	All the positive charge must be in a very small centre
A small number came straight back	The alpha particles had approached the positive nucleus ‘head on’ and been repelled straight back	All the positive charge must be in a very small centre

5. Neutrons
6. The number of electron shells
7. He knew there were undiscovered elements
8. The alkali metals
9. Group 7
10. It gets weaker (distance from nucleus and shielding effect)

Application

1. The plum pudding model of the atom described atoms as being a cloud of positive charge with electrons scattered randomly within it.
2. The nuclear model states that protons and neutrons are found in a very small nucleus, with electrons orbiting in shells around the nucleus and that most of the atom is empty space
3. Because they form an alkali (metal hydroxide) when they react with water
4. $4\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2$
5. Lithium floating on the water, moving around and a gas being given off

6. The outer shell electron of potassium is more easily lost as it is shielded from the nucleus by more electron shells than Lithium's outer electron is.
7. Lithium and Sodium are both in group 1 because they both have 1 electron in their outer shell. Lithium is 2.1 and Sodium is 2.8.1
8. The halogens get less reactive going down the group because, as the atom gets bigger, the positive charge from the nucleus is more shielded and atoms find it more difficult to attract an electron into the outer shell.
9. The noble gases are unreactive because they already have full outer shells so they don't need to gain or lose any electrons.
10. The boiling points of the noble gases increase as you go down the group as the atoms get bigger.

Extension

- Light bulbs are filled with Argon rather than air because Argon is unreactive and so won't react with the metal when it gets hot, but air contains oxygen which will react with the metal, corroding it.
- Add drops of chlorine water to the potassium bromide solution. The solution should turn orange/brown because bromine is displaced and the solution becomes potassium chloride.