- And thus have a significantly lower energy level (thus much higher IE)

The first ionisation energy provides evidence for the group of element

- The location of these 'big jumps' can be used to identify which group the element is in
- Looking at either a continuous chart of successive IE or a logarithm of ionisation energies it is possible to count the amount of electrons removed before these big jumps
- The electron removed first is the outermost electron, the second is the next electron in line, and the third is the next, if the jump appears here, then it is evidence that the element is within group two.
- This is because it takes a low amount of energy to remove the first electron as it has a higher energy due to the fact it is within a higher quantum shell, the same is seen for the second electron however slightly larger due to the lack of electron-electron repulsion
- The third electron however is seen to have a much higher IE, this is because it is in a lower quantum shell, which means that the electrons within have a much lower energy level, due to their greater nuclear attraction.
- This provides evidence that the element is in group 2, as each group defines the amount of electrons within the outermost quantum shell
- If it takes two electrons to be removed before a jump in IE then this shows that there is only 2 electrons in the outermost quantum shell and thus proof that it is a group 2 element.

(p) Know the number of electrons that can all the first four quantum shells

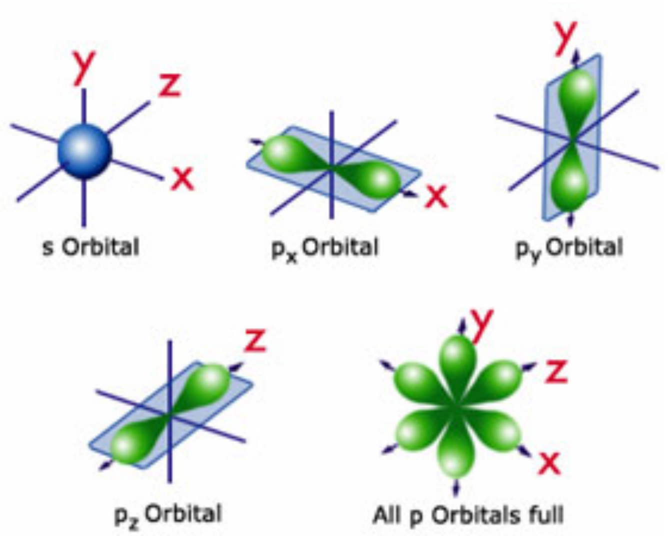
Number of electrons in each shell is determined by 2N^2 (N = number of quantum shell)

e.g. Quantum shell 2 = 2(2)^2 = 8

Quantum Shell	Number of Electrons
First QS	2(1)^2 = 2
Second QS	2(2)^2 = 8
Third QS	2(3)^2 = 18
Fourth QS	2(4)^2 = 32

(q) Know that an orbital is a region within an atom that can hold up to two electrons with opposite spins

An orbital, is a region within an atom that can hold up to two electrons, with opposite spins.



(w) Understand that electronic configuration determines the chemical properties of an element

The electronic configuration determines how many electrons will be in the valence shell, and so as a result, because the outermost electrons will always attract/repel making the chemical properties of this element, it directly affects what the properties will be.

With this in mind, elements within a group have a similar chemical property because they have the same outer shell electronic configuration.

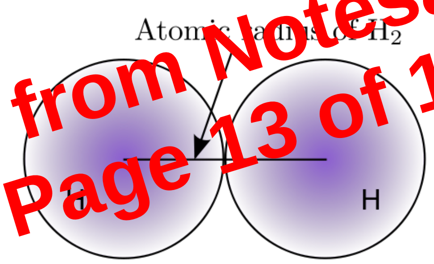
(x) Understand periodicity in terms of a repeating pattern across different periods

Periodicity:

- The elements in a Period, exhibit periodicity
- Elements in periods 2 and 3 show this the best
- Examples of periodicity is a regular repeating electronic configuration, boiling point, melting point, atomic radii and first ionisation energies

(y) Understand reasons for the trends in the following properties of the elements from periods 2 and 3 of the Periodic table
- The melting and boiling temperatures of the elements, based on given data, in terms of structure and bonding
- ionisation energy based on given data or recall of the plots of ionisation energy versus atomic number

Atomic Radii:
- The atomic radii is a measure of the size of the atoms
- It is the distance from the centre of the nucleus to the boundary of the electron clouds
- Since the electron clouds are not well defined, we can find the atomic radii by determining the distance between two nucleus and dividing it by two



- There is three types of atomic radii, the covalent radii (where the distance between two nuclei of covalently bonded atoms is measured) the van der Waals radii (where the distance between two nuclei of two atoms bonded only by van der Waals forces (intermolecular forces) is measured) and finally metallic radii (used for metals).
- Always compare like to like if given different ones