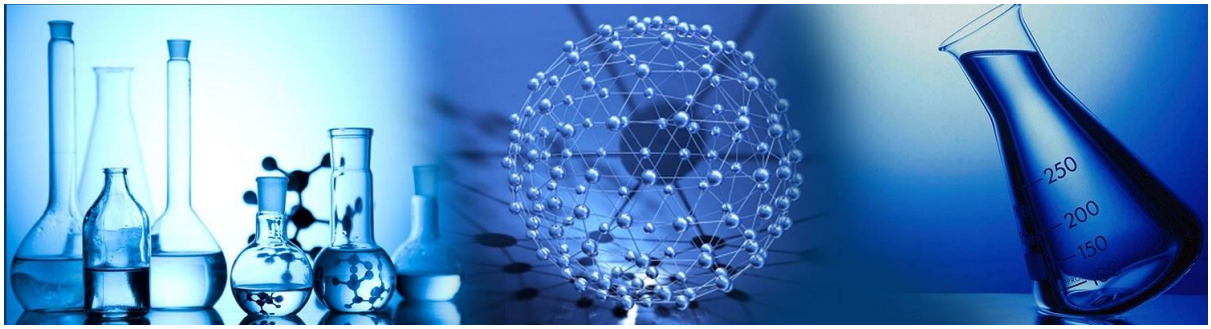


Chemistry lectures

Timetable

Miss Hayward

27th April: *Atomic structure*

4th May: *Bonding & Structure*

11th May: *Trends*

Mrs Faux

18th May: *Oxidation numbers*

1st June: *Calculations (1)*

6th June*: Calculations (2)*

What do you need?

- Periodic table
- Paper, pen and a calculator
- A phone available for Kahoots/ an ability to split the screen

During lectures

- Microphones on mute and cameras off
- Any questions can be asked in the chat- I will answer as soon as I can

You will be set work at the end of the session.

Lecture 1: Atomic structure

Learning objectives:

Part one:

-To revise the history of the atom

-To be able to calculate the number of electrons in a shell

- To learn what an atomic orbital is and give examples.

Part two:

-Revise what isotopes are.

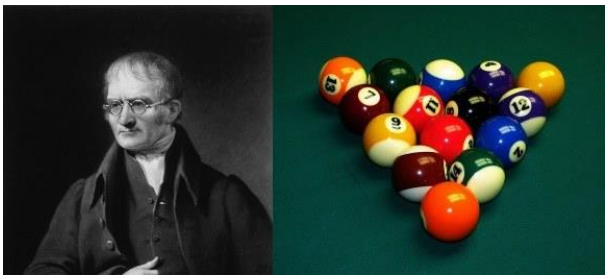
-Revise how to calculate relative atomic mass from isotopic mass and abundance

-To learn how to calculate abundance from relative atomic mass and isotopic mass.

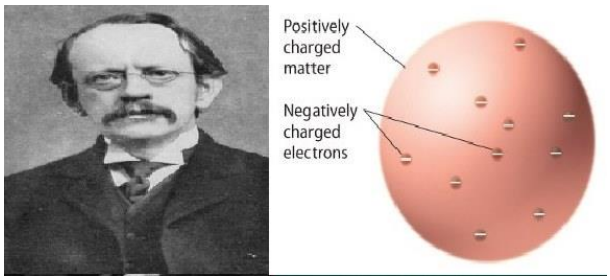
The History of the atom

Need to revise this?

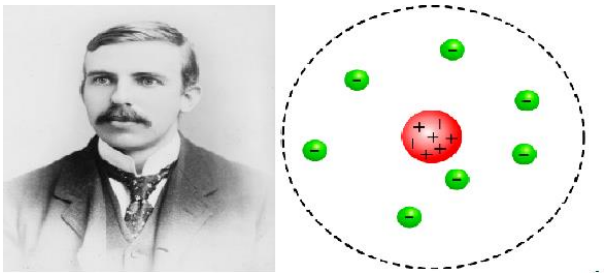
Need an extension?



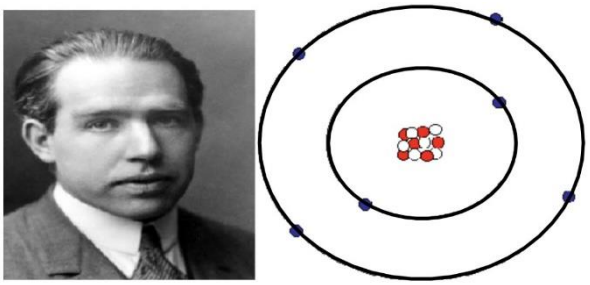
1 - Dalton's Model: atoms are solid spheres



2 - Thompson's model: Plum pudding



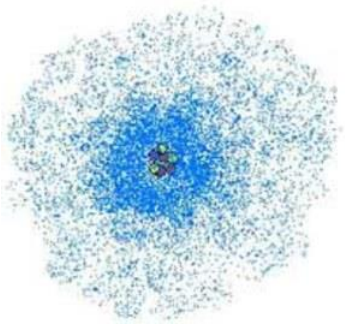
2 - Rutherford's model: electrons circling a nucleus



3 - Bohr's model: Planetary model

*Shells are made of **atomic orbitals***

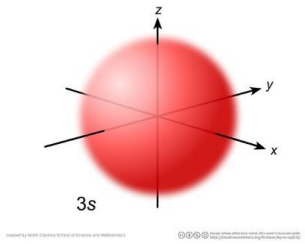
A region within an atom that can hold up to **2 electrons** (which can be anywhere within the orbital.)



The ***shape*** of the ***orbital*** is known as an ***electron cloud.*** This will be a ***negatively charged cloud***

***The 1st Shell**:* 2 electrons

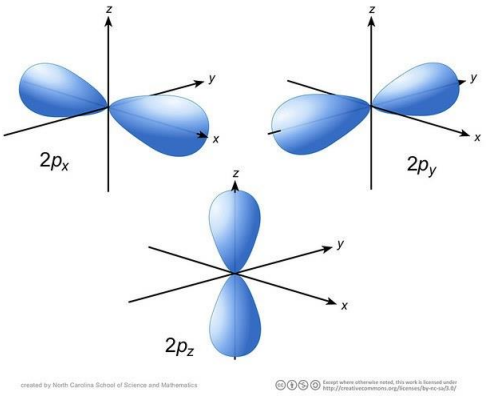
- O**ne s-orbital**
- Each s-orbital holds up to **two electrons**
- An s-orbital has a **spherical shape**



***The 2nd shell**:* 8 electrons

The 2nd shell has:

1. **One s-orbital** (2 electrons)
2. **Three p-orbitals** (2 electrons each= 6 electrons in total)



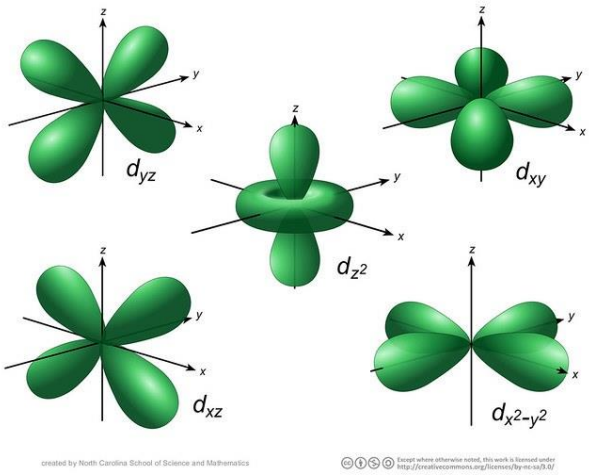
p-orbitals

- **Dumbbell shaped**
- There are **3 p-orbitals**

***The 3rd Shell**:* 18 electrons

The 3rd shell has:

1. **One s-orbital** (2 electrons)
2. **Three p-orbitals** (2 electrons each= 6 electrons in total)
3. **Five d-orbitals** (2 electrons each= 10 electrons in total)



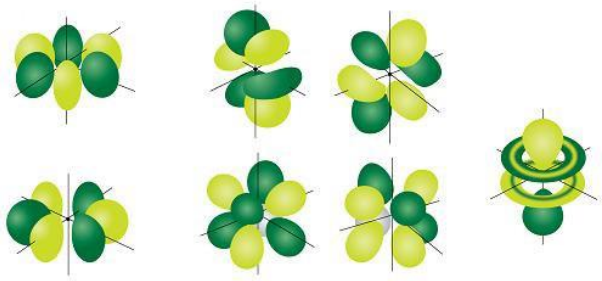
D-orbitals

- Vary in shape
- Each d-orbital holds up to **two electrons**

The 4th Shell: 32 electrons

The 4th shell has:

1. **One s-orbital** (2 electrons)
2. **Three p-orbitals** (2 electrons each= 6 electrons in total)
3. **Five d-orbitals** (2 electrons each= 10 electrons in total)
4. **Seven f-orbitals** (2 electrons each= 14 electrons in total)



F-orbitals

- Vary in shape
- **seven f-orbital** can hold up to **2 electrons.**

Questions:

1. Name the 4 different types of orbitals
2. State the shapes of the s and p-orbital
3. Fill in the table

Challenge:
Using the idea of orbitals, prove that there are 2 electrons in the first shell, 8 electrons in the second shell and 18 electrons in the third shell.

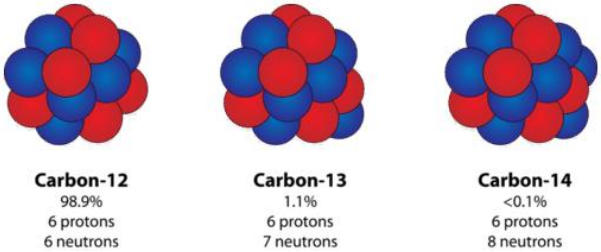
Shell number	Types or orbitals present
1	
2	
3	
4	

Isotopes & calculating relative atomic mass

Isotopes

Atoms of the same element with the ***same number of protons and electrons*** but a ***different number of neutrons.***

Need to revise isotopes?



Relative atomic mass

So, the relative atomic mass must take into account two things:

1. The mass of each of the isotopes
2. The percentage abundance of each isotope

The weighted mean mass of an atom compared to 1/12 of the mass of an atom of carbon=12

Questions

Calculate the relative atomic mass of the following elements. Give your answers to two decimal places.

a A sample of potassium consisting of 93.20% of ^{39}K, 0.07% of ^{40}K, and 6.73% of ^{41}K. *(1 mark)*

b A sample of antimony consisting of 56.87% of ^{121}Sb and 43.13% of ^{123}Sb. *(1 mark)*

c A sample of neon consisting of 91.07% of ^{20}Ne and 8.93% of ^{22}Ne. *(1 mark)*

Questions

1. Boron occurs naturally as a mixture of two isotopes, B-10 and B-11. Calculate the percentage abundance by mass in sample of Boron with the relative atomic mass of 10.8.

2. The relative atomic mass of thallium is 204.4. Thallium has two isotopes: thallium-203 and thallium-205. Calculate the percentage abundance of the isotopes