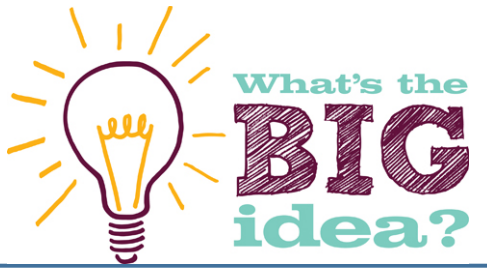
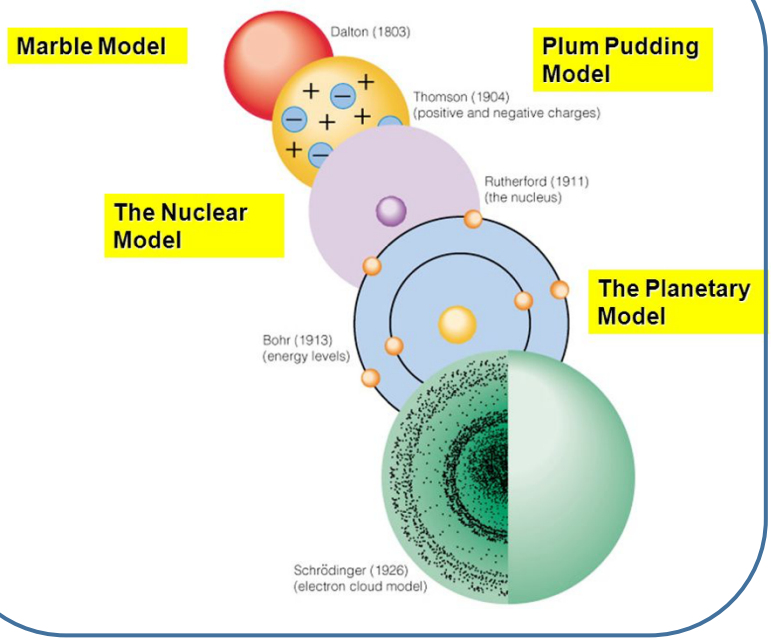
You need to know the content of this sheet. 100%

100% Sheet
Atomic Structure -1

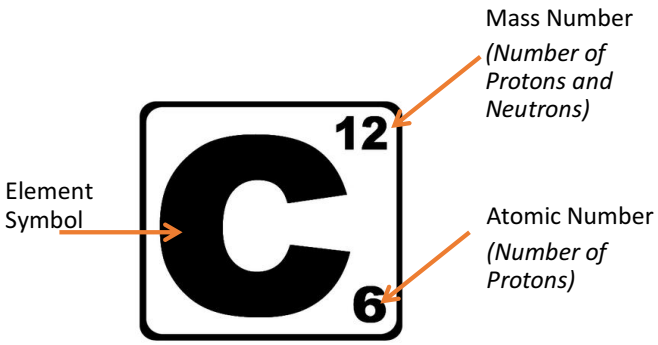


Matter

All material in the Universe is made of very small particles.



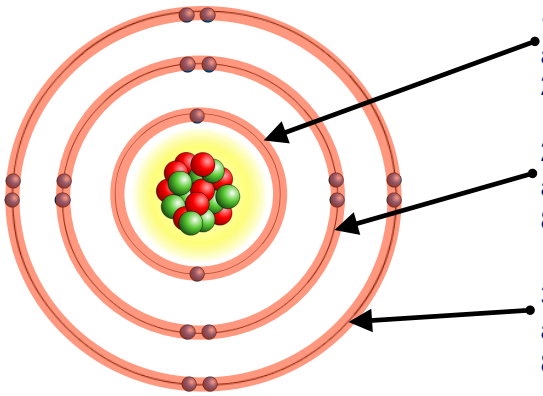
Sub-atomic Particle	Mass	Charge
Proton	1	+1
Neutron	1	0
Electron	Almost 0	-1



Number of Protons = Number of Electrons (shown by the bottom number)
Number of Neutrons = Mass Number – Atomic Number
big number – small number

How many electrons per shell?

Each shell has a maximum number of electrons that it can hold. Electrons will fill the shells nearest the nucleus first.

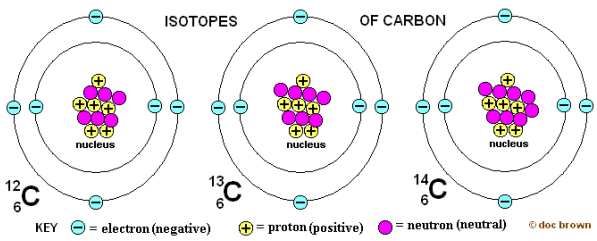


1st shell holds a maximum of **2 electrons**

2nd shell holds a maximum of **8 electrons**

3rd shell holds a maximum of **8 electrons**

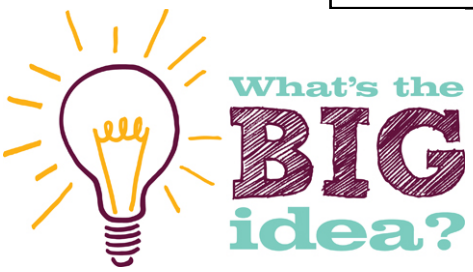
This **electron arrangement** is written as **2,8,8.**



Isotopes are different forms of the same element.
They have the same number of protons and electrons but DIFFERENT number of NEUTRONS

Learn the content then apply your knowledge

100% Sheet
Atomic Structure -1



Matter

All material in the Universe is made of very small particles.

$^{35}_{17}Cl$ $^{37}_{17}Cl$

Describe, in terms of sub-atomic particles, **one** similarity and **one** difference between atoms of the two isotopes of chlorine

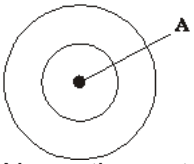
How did Mendeleev know that there must be undiscovered elements and how did he take this into account when he designed his periodic table?

By the early 20th century protons and electrons had been discovered.

Describe how this discovery allowed chemists to place elements in their correct order and correct group

Oxygen atoms have 8 electrons.

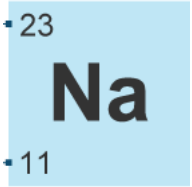
Complete the diagram to represent the arrangement of electrons in an oxygen atom.
Use crosses (×) to represent the electrons.



Name the part of the oxygen atom that is labelled **A** on the diagram

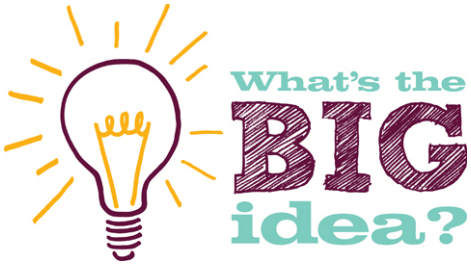
Compare the position of the subatomic particles in the plum pudding model with the nuclear model.

How many protons, neutrons & electrons? Draw the electronic structure



You need to know the content of this sheet. 100%

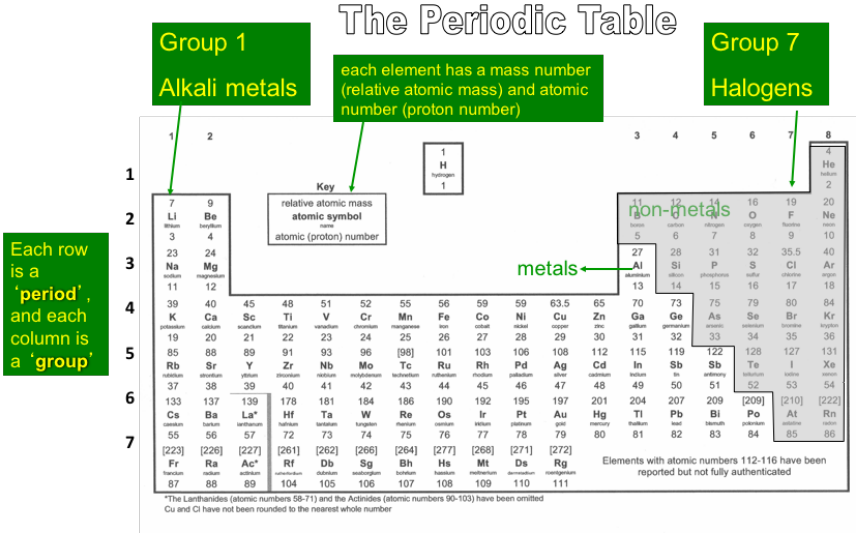
100% Sheet
Atomic Structure - 2



Matter

All material in the Universe is made of very small particles.

The Periodic Table



Key points

Elements are arranged in order of Atomic (proton) number

The number of electrons in the outer shell determines its group number

The number of shells determines its period number

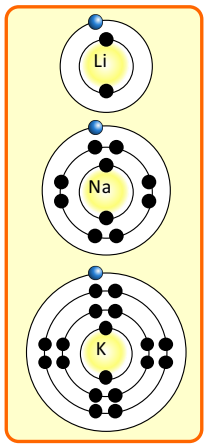
Group 0 elements have a full outer shell of electrons and are unreactive

All other elements want a full outer shell of electrons

Groups 1, 2 & 3 will lose electrons to have a full outer shell

Group 7 will gain an electron to have a full outer shell

The reactivity of alkali metals **increases** going down the group. What is the reason for this?

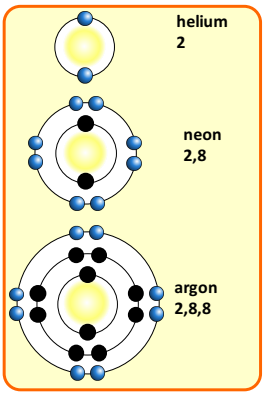


- The atoms of each element get larger going down the group.
- This means that the outer shell electron gets further away from the nucleus and is shielded by more electron shells.
- The further an electron is from the positive nucleus, the easier it can be lost in reactions.
- This is why the reactivity of the alkali metals increases going down group 1.

All noble gases have full outer electron shells and do not need to gain, lose or share electrons.

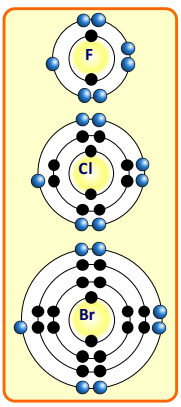
This means that:

- The noble gases are very stable and the most unreactive (or **inert**) of all the elements. All of the noble gases are similarly unreactive, up and down the group.
- They do not normally form bonds with other elements.
- They are **monatomic**, which means they exist as individual atoms. Most other gases are diatomic.



The reactivity of Halogens **decreases** going down the group. What is the reason for this?

- The atoms of each element get larger going down the group.
- This means that the outer shell gets further away from the nucleus and is shielded by more electron shells.
- The further the outer shell is from the positive attraction of the nucleus, the harder it is to attract another electron to complete the outer shell.
- This is why the reactivity of the halogens decreases going down group 7.



Group 1 - All soft grey metals, easy to cut and VERY reactive

React with air to make the metal OXIDE

React with water to make the metal HYDROXIDE (an alkali) and Hydrogen gas (highly flammable)

Group 7 – All DIATOMIC (Cl_2, Br_2, I_2)

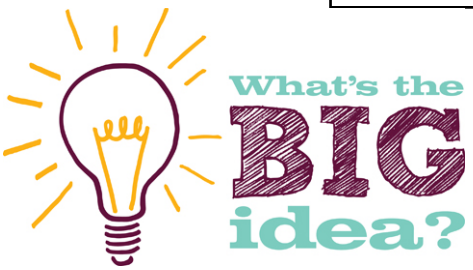
Chorine is a yellow/Green gas – Toxic

Bromine is a brown liquid

Iodine is a grey solid that SUBLIIMES directly to a purple gas

Learn the content then apply your knowledge

100% Sheet
Atomic Structure -1



Matter

All material in the Universe is made of very small particles.

Explain the order of reactivity of Group 7 elements.

Include information about atomic structure

Explain the order of reactivity of Group 7 elements.

Include information about atomic structure

Why are Potassium and Sodium in the same group on the periodic table? Refer to properties and electron arrangement

The alkali metal, Potassium, reacts with water in an explosive way.
Why is it called an alkali metal? Why does it react explosively? Write an equation to help with your answer

State why argon is used in the light bulb. Explain your answer in terms of the electronic structure of an argon atom