

Year 10

Chemistry booklet

Topic 1 - bonding

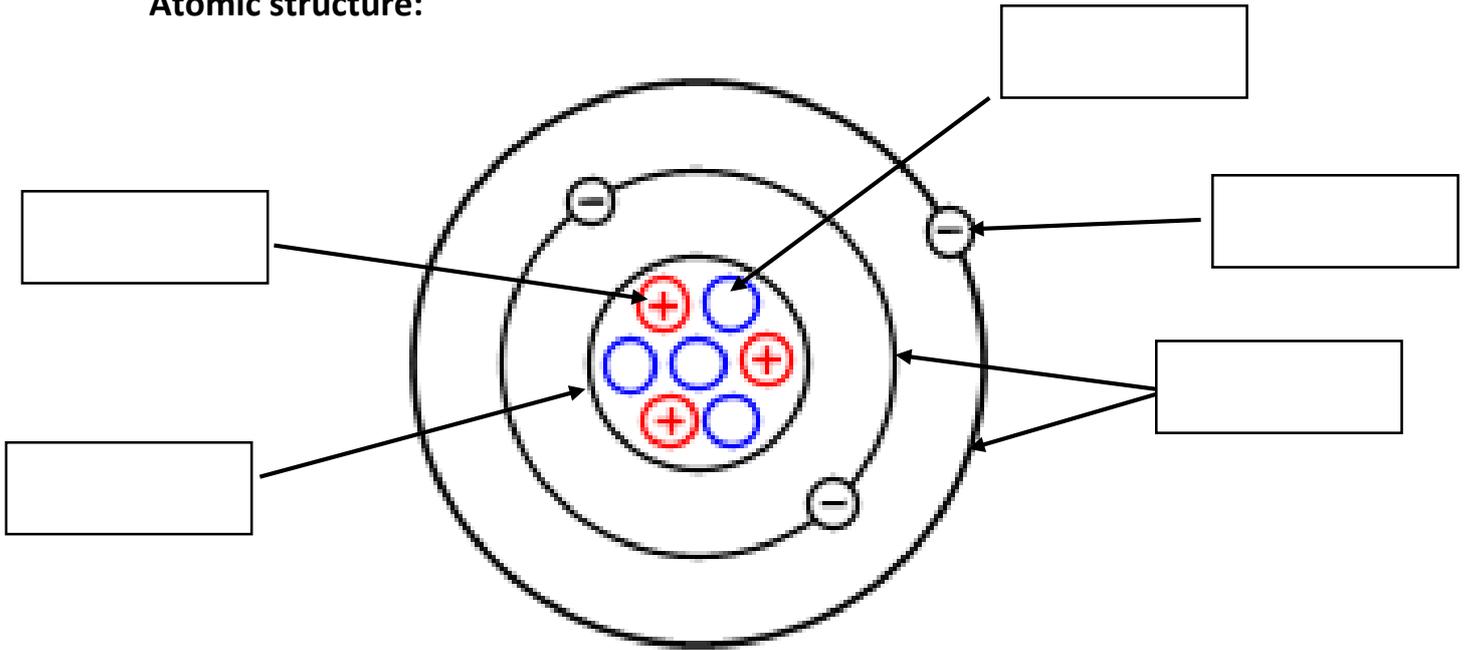
Name: _____

Bonding

Give a definition for each of these key words:

Atom	
Electrons	
Atomic number	
Mass number	
Electron shell	
Ion	
Charge	
Ionic bond	
Covalent bond	
Metallic bond	
Giant structure	
Simple structure	
Polymer	
Chemical equation	
State symbol	

Atomic structure:



Particle	Relative Charge	Relative Mass	Where in the Atom is it Found?
Proton			
Neutron			
Electron			

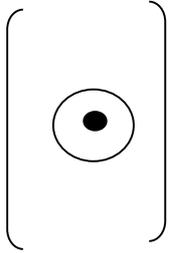
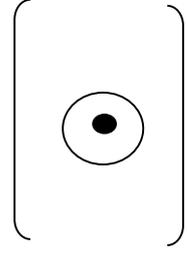
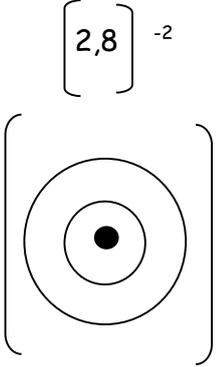
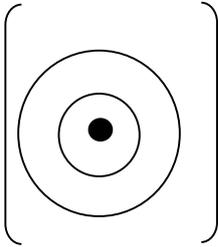
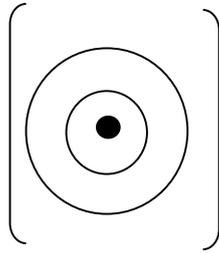
How can you use the periodic table to tell you the number of protons in an atom?

How can you use the periodic table to tell you the number of neutrons in an atom?

How can you use the periodic table to tell you the number of electrons in an atom?

How can you use the periodic table to tell you the arrangement of electrons in an atom?

Ions and electronic arrangement

	lithium ion	beryllium ion	oxide ion	fluoride ion	sodium ion
Number of protons			8		
Number of electrons			10		
Overall electrical charge			-2		
Electronic structure			$[2,8]^{-2}$ 		

What is an ion? _____

Explain why ions are electrically charged.

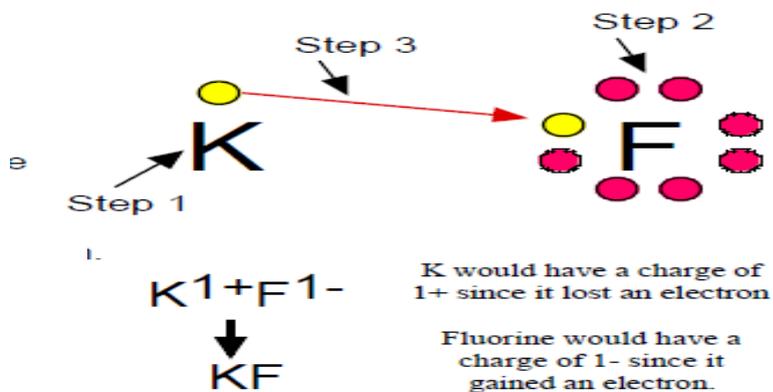
What do all ions have in common in terms of their electronic structure?

How do metals become metal ions? _____

How do non-metals become ions? _____

Ionic
Bonding

e.g. Potassium and fluorine



Step 1 – Draw the outside electrons of the metal in one colour

Step 2 – draw the outside electrons of the non-metal in a different colour

Step 3 – move electrons so they both have full outer shells

Step 4 – write down what charges each ion now has

1. Lithium and chlorine

4. Potassium and oxygen

2. Magnesium and oxygen

5. Beryllium and sulfur

3. Sodium and iodine

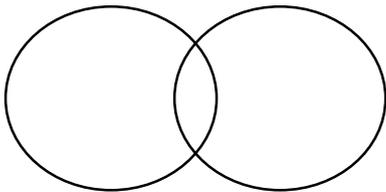
6. Magnesium and chlorine

Covalent
Bonding

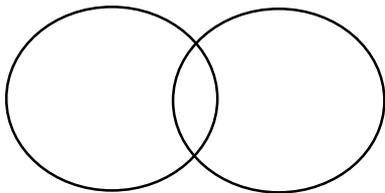
For the elements given:

1. Draw a dot and cross diagram to show how they bond covalently
2. Label any single/double/triple bonds

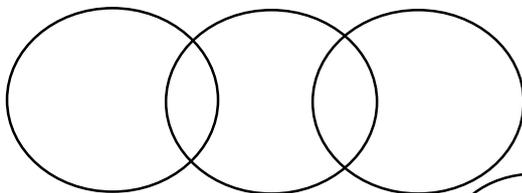
Hydrogen and hydrogen (H_2)



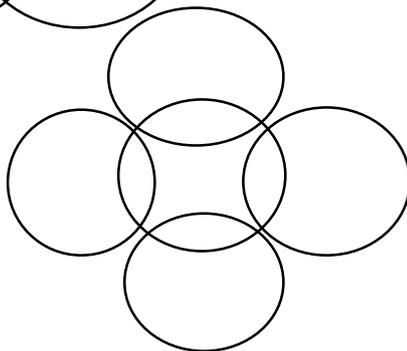
Fluorine and fluorine (F_2)



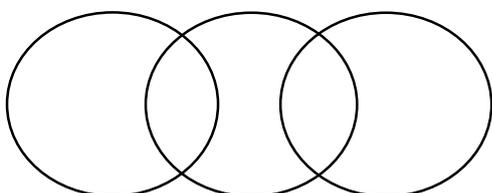
Hydrogen and oxygen (H_2O)



Carbon and hydrogen (CH_4)



Carbon and oxygen (CO_2)



Polymers

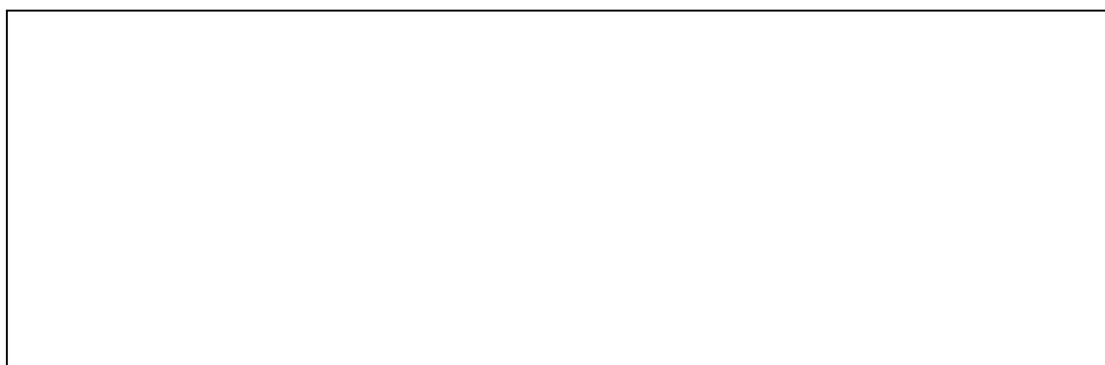
Name of MONOMER	Name of POLYMER	Displayed formula of the monomer	Displayed formula of the polymer showing three REPEAT UNITS	Polymer formula
Ethene		$ \begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array} $		
Propene				$ \left[\begin{array}{c} \text{-CH}_2\text{-CH-} \\ \\ \text{CH}_3 \end{array} \right] $
	Polychloroethene		$ \begin{array}{cccccc} \text{H} & \text{Cl} & \text{Cl} & \text{H} & \text{Cl} & \\ & & & & & \\ \text{-C-} & \text{C-} & \text{C-} & \text{C-} & \text{C-} & \text{-} \\ & & & & & \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \end{array} $	

Metallic bonding

Complete the following sentences:

Metals consist of _____ structures of _____ arranged in a regular pattern. The electrons in the _____ shell of metal atoms are _____, and are free to move throughout the structure. Therefore the structure is formed by _____ charged metal ions held together by a 'sea' of _____.

In the box below, draw a diagram representing the bonding in an iron nail. Label it as fully as you can.



3. Match up the **properties** of metals and the **reason** for them. You could colour in the matching property and definition in the same colour.

P: High melting and boiling points

R: The delocalised electrons are free to move around the structure

P: Ductile (Can be stretched and squashed)

R: Because the electrons are free to move, the atoms can slide over each other.

R: The bonds in metals don't break easily

P: Good conductor of heat and electricity

R: The bonds in metals are very strong

P: Malleable (Can be hammered into shape)

Research task

Graphene and the fullerenes

You need to produce a leaflet / powerpoint / video / presentation about graphene and the fullerenes.

It should include:

- The structure of graphene
- Why people are so interested in graphene
- Possible uses of graphene – now and in the future
- What are fullerenes
- What is buckminsterfullerene
- Possible uses of fullerenes – now and in the future

Research links to get you started...

The story of graphene – The University of Manchester

<http://www.graphene.manchester.ac.uk/explore/the-story-of-graphene/>

What is graphene?

<http://nanotechnologyforkids.weebly.com/graphene.html>

<http://www.physics.org/article-questions.asp?id=67>

Nine incredible uses for graphene

<http://gizmodo.com/5988977/9-incredible-uses-for-graphene>

What are fullerenes?

<http://www.wisegeek.com/what-are-fullerenes.htm>

Applications of fullerenes

<http://www.understandingnano.com/buckyballs-fullerenes.html>