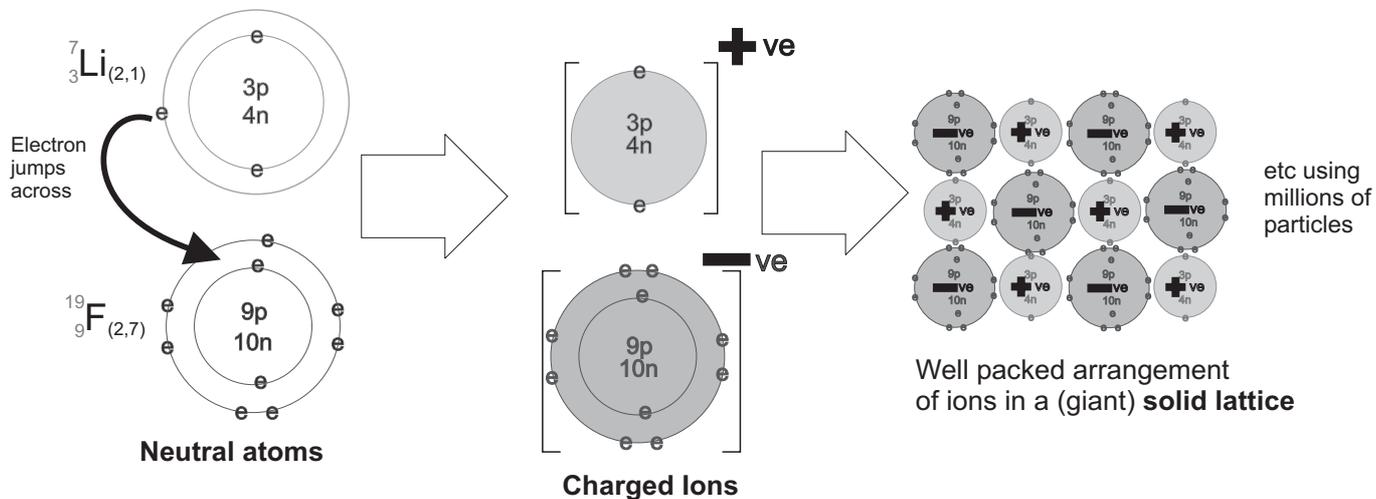


Ionic Bonding

Atoms are neutral particles. Under certain conditions, when atoms combine they become charged particles called **ions**.

	To be familiar with the different types of bonding
	To show how different atoms change as they bond together.

We say that the charged particles are held together by **ionic bonding**



Using the following information on the *starting neutral atoms*, show how these would form **ions** which would then cling together to form a solid compound.

<p>Sodium chloride</p> <p>$^{23}_{11}\text{Na}$ (2,8,1) $^{35}_{17}\text{Cl}$ (2,8,7)</p>	<p>Magnesium oxide</p> <p>$^{24}_{12}\text{Mg}$ (2,8,2) $^{16}_8\text{O}$ (2,6)</p>
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<p>Magnesium fluoride</p> <p>$^{19}_9\text{F}$ (2,7) $^{24}_{12}\text{Mg}$ (2,8,2) $^{19}_9\text{F}$ (2,7)</p>

Now on lined paper show how **TWO sodium atoms** would form ions with **ONE oxygen atom** would turn into sodium oxide.

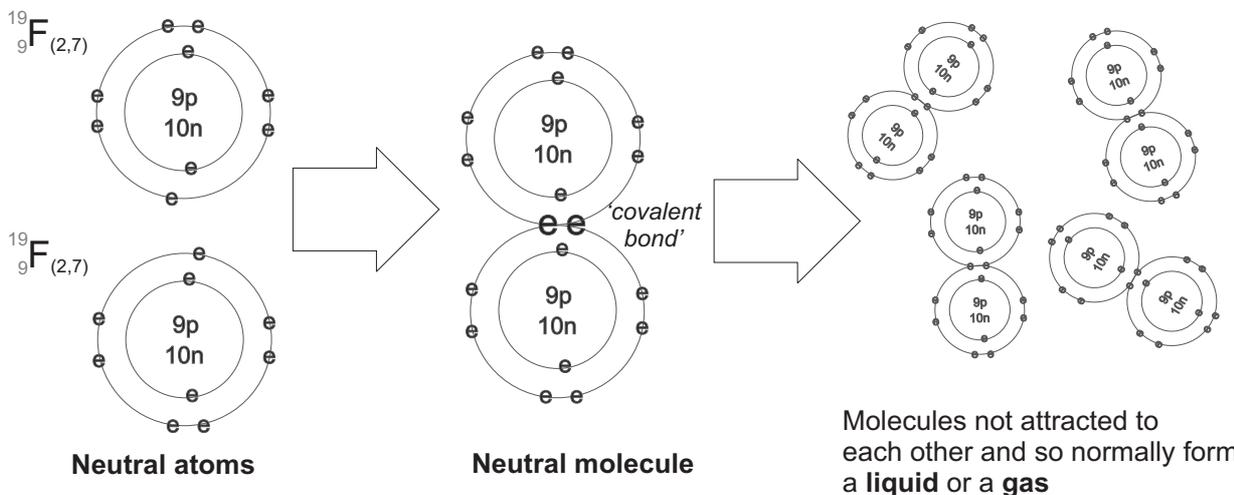
Covalent Bonding

It is possible for atoms to join together and stay **neutral**. This is called **covalent bonding**. The word covalent means to share (a pair of) electrons



To be familiar with the different types of bonding

To show how different atoms change as they bond together.



Remember the whole point of atoms joining together is so that their outermost ring of electrons becomes filled completely.



Tasks

Draw 'dot and cross' diagrams to show the covalent bonding that keeps together these molecules.

<p>Methane gas</p> <p>Made from these atoms</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $C_{(2,4)} H_{(1)} H_{(1)} H_{(1)} H_{(1)}$ dot & cross picture </div>	<p>Ammonia gas</p> <p>Made from these atoms</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $N_{(2,5)} H_{(1)} H_{(1)} H_{(1)}$ dot & cross picture </div>
<div style="border: 1px solid black; padding: 10px; display: flex; align-items: center;"> <div style="text-align: center; margin-right: 20px;"> $\begin{array}{c} H \\ \\ H - C - H \\ \\ H \end{array}$ </div> <p>In a previous topic about Oil you drew methane gas out with a stick picture</p> </div>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Draw out ammonia as a stick picture</p> </div>

In a stick picture, each dash represents a covalent bond. It also represents a certain number of electrons - how many electrons is this ?

Some substances contain a double bond eg oxygen $O=O$. How many electrons are involved in the double bond which holds the atoms together ?

Draw out the following molecules using dot and cross (you do not have to show the nucleus)

Covalent		Covalent		Covalent (Double bond)	
$^{35}_{17}Cl_{(2,8,7)}$	$^{35}_{17}Cl_{(2,8,7)}$	$^1_1H_{(1)}$	$^{16}_8O_{(2,6)}$	$^1_1H_{(1)}$	$^{16}_8O_{(2,6)}$
				$^{16}_8O_{(2,6)}$	$^{16}_8O_{(2,6)}$

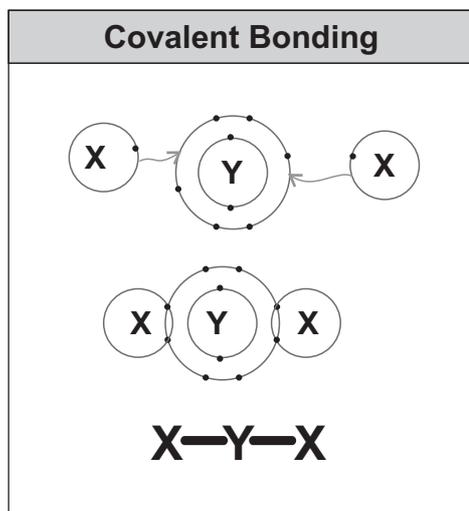
Covalent Bonding

In covalent bonding, electrons are not completely transferred from one atom to another like ionic bonding. Instead they are **shared** by both atoms.

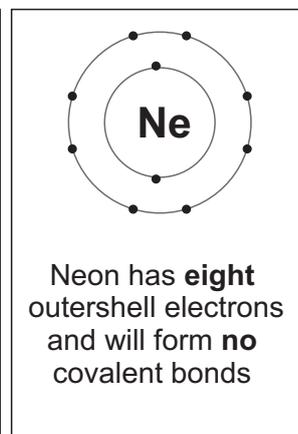
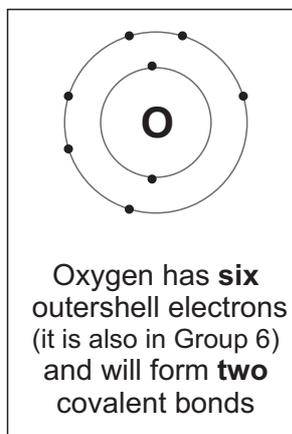
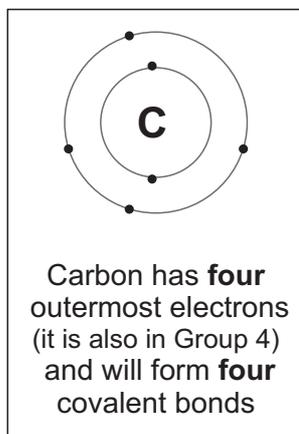


To be familiar with the different types of bonding

To show how different atoms change as they bond together.

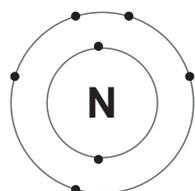


The normal number of bonds which an atom will make can be easily worked out.



There is a link between the number of covalent bonds which an atom will form and its outermost electrons

Describe this link

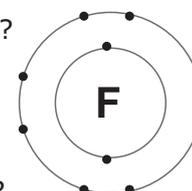


Q1 Which Group of the Periodic Table is **Nitrogen** found in ?

Q2 How many covalent bonds will it form ?

Q3 Which Group of the Periodic Table is **Fluorine** found in ?

Q4 How many covalent bonds will it form ?



The number of covalent bonds which element can form is shown below in a different way with sticks

Hydrogen only 1 bond	Oxygen always 2 bonds	Nitrogen always 3 bonds	Carbon always 4 bonds
H —			



Use these to help draw out the stick diagrams for the following substances on lined paper

Methane, CH₄

Ethane, C₂H₆

Water, H₂O,

Ammonia, NH₃

Methanal, CH₂O

These are slightly more difficult challenges

Ethene, C₂H₄

Carbon dioxide, CO₂

Dinitrogen trioxide, N₂O₃