

Its electron arrangement is 2,6 which means it has six electrons in its outer shell.

To become stable, oxygen could lose all 6 electrons but it is easier for it to gain two electrons instead to fill its outer shell.

i.e. The O atom gains two electrons to form an oxide ion.

1

oxygen atom:

8 protons (+)

8 electrons (-)

overall charge = 0

oxide ion:

8 protons (+)

10 electrons (-)

overall charge = 2-

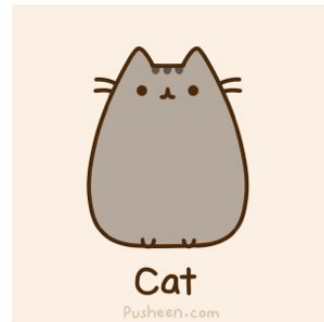
We write the oxide ion as **O<sup>2-</sup>** showing it has a charge of 2-  
The electron arrangement of the oxide ion is now 2,8.

# Ion questions

- Draw the orbital diagrams and electron configurations of the ions that these elements form and state their charge.
1. Li
  2. O
  3. Cl
  4. Mg
  5. Al
  6. Will neon form an ion?

- We can use the periodic table to help us work out the charges on ions.
- Atoms with 1,2 or 3 electrons in their outer shell (groups 1,2 and 3) lose electrons to become positive ions.
- Atoms with 5,6 or 7 electrons in their outer shell (groups 15,16 and 17) gain electrons to become negative ions.
- Atoms with 4 electrons in their outer shell do not gain or lose electrons but share electrons with other atoms.
- Group 18 atoms do not form ions at all because they already have full outer shells and are stable.

# Ions



- Positive ions are also called **CATIONS**
- Negative ions are also called **ANIONS**
- Positive ions keep their same name.
- Negative ions change the end of their name.  
**O<sup>2-</sup> S<sup>2-</sup> Cl<sup>-</sup>** all end in **-ide**
- Some ions contain more than one type of atom. These are called polyatomic ions. (polyatomic = many atoms). The atoms in polyatomic ions are all non-metals.  
**CO<sub>3</sub><sup>2-</sup> SO<sub>4</sub><sup>2-</sup> NO<sub>3</sub><sup>-</sup>** and **HCO<sub>3</sub><sup>-</sup>** all end in **-ate**

# How to write chemical formulae using ions

# Step 1.

Write the name of the compound and use your ion table to write the ions for each part of the name underneath.

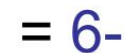
Example:

What is the formula of **aluminium sulfide**?



## Step 2.

Add more of each ion  
so that the total  
charges are equal.



This tells you how many  
lots of each ion are  
needed in the  
chemical formula.

2 lots of  
Al

3 lots of  
S

Show this in the  
chemical formula



Write formula for these compounds  
following the rules

1. Barium oxide
2. Lithium chloride
3. Aluminium chloride
4. Calcium chloride
5. Iron (III) oxide
6. Sodium oxide
7. Aluminium oxide



# Answers

1. BaO
2. LiCl
3. AlCl<sub>3</sub>
4. CaCl<sub>2</sub>
5. Fe<sub>2</sub>O<sub>3</sub>
6. Na<sub>2</sub>O
7. Al<sub>2</sub>O<sub>3</sub>

# Ionic compounds

- Positive and negative ions join together to form **ionic compounds**.
  - The forces holding the ions together are called **ionic bonds**.
  - Ionic compounds are easy to recognise because they contain both positive **metal ions** and **negative non-metal ions**.
    - MgO = magnesium oxide
    - NaCl = sodium chloride
    - CaCO<sub>3</sub> = calcium carbonate
    - CuSO<sub>4</sub> = copper sulfate
- Circle the metal ion in each of the above examples.