

1 - FORMULAS



If you are serious about doing A level Chemistry, you **MUST** be able to write a formula without a second thought. It is the single most essential skill for an A level chemist.

You have to know and be able to use the information on this page – you should not be looking it up. There is no data sheet with ion charges at A level.

If you can't write a formula in an instant, **DROP CHEMISTRY NOW** and choose something else.

Elements

Monatomic	Simple molecular	Ionic	Metallic	Giant covalent
helium He neon Ne argon Ar krypton Kr xenon Xe radon Rn	hydrogen H ₂ nitrogen N ₂ oxygen O ₂ fluorine F ₂ chlorine Cl ₂ bromine Br ₂ iodine I ₂ phosphorus P ₄ sulfur S ₈	There are no ionic elements!!	The formula is just the symbol, e.g. magnesium Mg iron Fe sodium Na nickel Ni	The formula is just the symbol diamond C graphite C silicon Si

Compounds

Monatomic	Simple molecular	Ionic	Metallic	Giant covalent
There are no monatomic compounds!!	Some common molecular compounds: CO ₂ carbon dioxide CO carbon monoxide NO nitrogen monoxide NO ₂ nitrogen dioxide SO ₂ sulfur dioxide SO ₃ sulfur trioxide NH ₃ ammonia CH ₄ methane H ₂ S hydrogen sulfide	These have to be worked out using ion charges – you have to know these at AS/A level! LEARN them ASAP. Note these acids: hydrochloric acid sulfuric acid nitric acid phosphoric acid	There are no metallic compounds!!	silicon dioxide SiO ₂

Positive ions		Negative ions	
Group 1 ions: lithium Li ⁺ sodium Na ⁺ potassium K ⁺ Group 2 ions: magnesium Mg ²⁺ calcium Ca ²⁺ barium Ba ²⁺	Group 3 ions: aluminium Al ³⁺ Other common ions silver Ag ⁺ zinc Zn ²⁺ ammonium NH ₄ ⁺ hydrogen H ⁺	Group 7 ions: fluoride F ⁻ chloride Cl ⁻ bromide Br ⁻ iodide I ⁻ Group 6 ions: oxide O ²⁻ sulfide S ²⁻	Other common ions nitrate NO ₃ ⁻ sulfate SO ₄ ²⁻ carbonate CO ₃ ²⁻ hydrogencarbonate HCO ₃ ⁻ hydroxide OH ⁻ hydride H ⁻ phosphate PO ₄ ³⁻

Chemical Formulae of Ionic Compounds

Remember that for ionic compounds the overall charge needs to be zero

The charge of some ions can be worked out from the periodic table

Some common ions you need to know:

Group 1 element generally form $1+$ ions

Group 2 element generally form $2+$ ions

Group 3 element generally form $3+$ ions

Group 5 element generally form $3-$ ions

Group 6 element generally form $2-$ ions

Group 7 element generally form $1-$ ions

You need to know the formula of common ions. Learn this table.

Positive ions		Negative ions	
Name	Formula	Name	Formula
Hydrogen	H ⁺	Chloride	Cl ⁻
Sodium	Na ⁺	Bromide	Br ⁻
Silver	Ag ⁺	Fluoride	F ⁻
Potassium	K ⁺	Iodide	I ⁻
Lithium	Li ⁺	Hydride	H ⁻
Magnesium	Mg ²⁺	nitride	N ³⁻
Ammonium	NH ₄ ⁺	Hydroxide	OH ⁻
Barium	Ba ²⁺	Nitrate	NO ₃ ⁻
Calcium	Ca ²⁺	Oxide	O ²⁻
Copper (II)	Cu ²⁺	Sulfide	S ²⁻
Aluminium	Al ³⁺	Sulfate	SO ₄ ²⁻
Gallium	Ga ³⁺	Carbonate	CO ₃ ²⁻
Zinc	Zn ²⁺	Hydrogencarbonate	HCO ₃ ⁻
Iron(II)	Fe ²⁺	Phosphate	PO ₄ ³⁻
Iron(III)	Fe ³⁺	Manganate(VII)	MnO ₄ ⁻

When an ionic compound is formed the charges on the ions cancel out.

To work out the formula for a simple ionic compound do the following steps.

Step 1: Work out the charges on the two ions (use the periodic table and the table above)

Step 2: Add ions (if necessary) until the overall charge is neutral

Step 3: Count up the number of each ion and write out the formula (if there is one of an ion you do not need to write 1 next to the symbol).