



Chemistry: **Transition from GCSE to AS level**

Part 1 - writing chemical formula

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Recap formula of ions and then
use these to write a formula!

Name of element / group
hydrogen
helium
lithium
beryllium
boron
carbon
nitrogen
oxygen
fluorine
neon
sodium
magnesium
aluminium
silicon
phosphorus
sulfur
chlorine
argon
potassium
calcium
iron
copper
zinc
silver
bromine
iodine
carbonate
nitrate
sulfate
phosphate
hydrogencarbonate
ammonium

Name of element / group	Symbol
hydrogen	H
helium	He
lithium	Li
beryllium	Be
boron	B
carbon	C
nitrogen	N
oxygen	O
fluorine	F
neon	Ne
sodium	Na
magnesium	Mg
aluminium	Al
silicon	Si
phosphorus	P
sulfur	S
chlorine	Cl
argon	Ar
potassium	K
calcium	Ca
iron	Fe
copper	Cu
zinc	Zn
silver	Ag
bromine	Br
iodine	I
carbonate	
nitrate	
sulfate	
phosphate	
hydrogencarbonate	
ammonium	

Name of element / group	Symbol	GCSE electronic configuration
hydrogen	H	1
helium	He	2
lithium	Li	2,1
beryllium	Be	2,2
boron	B	2,3
carbon	C	2,4
nitrogen	N	2,5
oxygen	O	2,6
fluorine	F	2,7
neon	Ne	2,8
sodium	Na	2,8,1
magnesium	Mg	2,8,2
aluminium	Al	2,8,3
silicon	Si	2,8,4
phosphorus	P	2,8,5
sulfur	S	2,8,6
chlorine	Cl	2,8,7
argon	Ar	2,8,8
potassium	K	2,8,8,1
calcium	Ca	2,8,8,2
iron	Fe	
copper	Cu	
zinc	Zn	
silver	Ag	
bromine	Br	
iodine	I	
carbonate		
nitrate		
sulfate		
phosphate		
hydrogencarbonate		
ammonium		

Name of ion / group	Symbol	GCSE electronic configuration	Charge
hydrogen	H	1	1+
helium	He	2	
lithium	Li	2,1	1+
beryllium	Be	2,2	2+
boron	B	2,3	3+
carbon	C	2,4	
nitride	N	2,5	3-
oxide	O	2,6	2-
fluoride	F	2,7	1-
neon	Ne	2,8	
sodium	Na	2,8,1	1+
magnesium	Mg	2,8,2	2+
aluminium	Al	2,8,3	3+
silicon	Si	2,8,4	
phosphide	P	2,8,5	3-
sulfide	S	2,8,6	2-
chloride	Cl	2,8,7	1-
argon	Ar	2,8,8	
potassium	K	2,8,8,1	1+
calcium	Ca	2,8,8,2	2+
iron	Fe		2+ or 3+
copper	Cu		2+
zinc	Zn		2+
silver	Ag		1+
bromide	Br		1-
iodide	I		1-
carbonate			
nitrate			
sulfate			
phosphate			
hydrogencarbonate			
ammonium			

Oxdn no.
Noble gases &
covalent bonds

Name of ion / group	Symbol	GCSE electronic configuration	Charge	Ion
hydrogen	H	1	1+	H ⁺
helium	He	2		
lithium	Li	2,1	1+	Li ⁺
beryllium	Be	2,2	2+	Be ²⁺
boron	B	2,3	3+	B ³⁺
carbon	C	2,4		
nitride	N	2,5	3–	N ^{3–}
oxide	O	2,6	2–	O ^{2–}
fluoride	F	2,7	1–	F [–]
neon	Ne	2,8		
sodium	Na	2,8,1	1+	Na ⁺
magnesium	Mg	2,8,2	2+	Mg ²⁺
aluminium	Al	2,8,3	3+	Al ³⁺
silicon	Si	2,8,4		
phosphide	P	2,8,5	3–	P ^{3–}
sulfide	S	2,8,6	2–	S ^{2–}
chloride	Cl	2,8,7	1–	Cl [–]
argon	Ar	2,8,8		
potassium	K	2,8,8,1	1+	K ⁺
calcium	Ca	2,8,8,2	2+	Ca ²⁺
iron	Fe		2+ or 3+	Fe ²⁺ or Fe ³⁺
copper	Cu		2+	Cu ²⁺
zinc	Zn		2+	Zn ²⁺
silver	Ag		1+	Ag ⁺
bromide	Br		1–	Br [–]
iodide	I		1–	I [–]
carbonate				CO ₃ ^{2–}
nitrate				NO ₃ [–]
sulfate				SO ₄ ^{2–}
phosphate				PO ₄ ^{3–}
hydrogencarbonate				HCO ₃ [–]
ammonium				NH ₄ ⁺

Name of ion / group	Ion
hydrogen	H ⁺
helium	He
lithium	Li ⁺
beryllium	Be ²⁺
boron	B ³⁺
carbon	
nitride	N ³⁻
oxide	O ²⁻
fluoride	F ⁻
neon	
sodium	Na ⁺
magnesium	Mg ²⁺
aluminium	Al ³⁺
silicon	
phosphide	P ³⁻
sulfide	S ²⁻
chloride	Cl ⁻
argon	
potassium	K ⁺
calcium	Ca ²⁺
iron	Fe ²⁺ or Fe ³⁺
copper	Cu ²⁺
zinc	Zn ²⁺
silver	Ag ⁺
bromide	Br ⁻
iodide	I ⁻
carbonate	CO ₃ ²⁻
nitrate	NO ₃ ⁻
sulfate	SO ₄ ²⁻
phosphate	PO ₄ ³⁻
hydrogencarbonate	HCO ₃ ⁻
ammonium	NH ₄ ⁺

How to write the formula of a compound:

1. Write down the elements/ions that make up the compound (*care with their **charges***)
2. Cross the **charges** over and write them as sub-scripts (**drop and cross**)
3. Put brackets around groups (if present)
4. Simplify **charges** (if possible) by dividing by 2, 3 (or 4)

example magnesium chloride:

- 1 magnesium and chlor**ide**
- 2 **charge** of Mg is +2 and Cl is -1.
- 3 swap **charges** over (**drop and cross**)



example sodium oxide

- 1 sodium and ox**ide**
- 2 **charge** of Na is +1 and O is -2.
- 3 swap **charges** over (**drop and cross**)



example iron(II) nitrate

- 1 iron and nitrate
(*because iron has two **charges** you will be told it - roman numerals are used*)
- 2 **charge** of Fe is +2 and NO₃ is -1.
- 3 swap **charges** over (**drop and cross**)
- 4 put brackets around group, leads to answer of



Alternative approach:

Formula for magnesium chloride

Ions are:



since compounds have **no** charge the charges **must** cancel -
we will need 2x Cl^{-} for every Mg^{2+}

So formula is **MgCl_2**

Task:
Write the formula
of these compounds

NAME	WORKING	ANSWER
1. potassium chloride		
2. silver nitrate		
3. calcium sulfate		
4. magnesium oxide		
5. zinc bromide		
6. sodium oxide		
7. ammonium nitrate		
8. beryllium hydrogencarbonate		
9. sodium hydroxide		
10. hydrogen sulfate		
11. iron(II) oxide		
12. copper hydroxide		
13. lithium carbonate		
14. ammonium phosphate		
15. aluminium carbonate		
16. potassium sulfate		
17. silver sulfide		
18. boron sulfate		
19. iron(III) nitrate		
20. aluminium fluoride		

Pause this presentation while you complete the exercise on the previous page.

When complete move to the next page where you can check your answers.

NAME	ANSWER
1. potassium chloride	KCl
2. silver nitrate	AgNO ₃
3. calcium sulfate	CaSO ₄
4. magnesium oxide	MgO
5. zinc bromide	ZnBr ₂
6. sodium oxide	Na ₂ O
7. ammonium nitrate	NH ₄ NO ₃
8. beryllium hydrogencarbonate	Be(HCO ₃) ₂
9. sodium hydroxide	NaOH
10. hydrogen sulfate	H ₂ SO ₄
11. iron(II) oxide	FeO
12. copper hydroxide	Cu(OH) ₂
13. lithium carbonate	Li ₂ CO ₃
14. ammonium phosphate	(NH ₄) ₃ PO ₄
15. aluminium carbonate	Al ₂ (CO ₃) ₃
16. potassium sulfate	K ₂ SO ₄
17. silver sulfide	Ag ₂ S
18. boron sulfate	B ₂ (SO ₄) ₃
19. iron(III) nitrate	Fe(NO ₃) ₃
20. aluminium fluoride	AlF ₃

Having checked your work you will have either:

1. Completed the task correctly - well done :)
2. Made some mistakes - which you now understand (having seen the correct answer) - that's OK as you have 'learned from your mistakes'
3. Do not understand the answer - if this is the case you **must** seek assistance from your teacher (if you do not then you will **never** understand this and this may be a building block for later work!)

When you're confident with this
topic move onto part 2:

Calculating M_r of a compound