WRITING CHEMICAL FORMULAS

ANSWER KEY

Consider the packets of colour squares that we used to construct molecules:

	+1	+2	+3	???	-1	-2	-3
COLOUR	Light blue	Green	Pink	Mustard	White	Purple	Dark blue
ELEMENTS *Or groups of elements* **that had this identity Or "charge"**	Na K	Ca Mg	Al B	Sn Cu Fe	Cl F OH	O S CO_3	N P PO_4

On the following page, complete the combinations that would make a neutral molecule.

AFTER you complete the next page, come back and write some rules to follow for combining elements (and groups of elements) in order to make neutral, stable molecules:

1. You can only combine positives with negatives. (opposites)
The positives must go first and the negatives must go second
2. The positives must balance the negatives – they must all add up to zero
3. Write a little "subscript" to show how many of each you need.
The small numbers are called subscripts
Example: $CoCl_2$ means one Co with 2 Cl; K_2S 2 K and 1 S; Na_3N 3 Na with 1 N
4. Elements in the same column on the periodic table have the same charge.
Example: H, Li, K, Rb, Cs, Fr all have a +1 charge
O, S, Se… all have a -2 charge
5. Some elements have unknown charges. Elements under columns 2 to 12 can have a different charge, depending on what they are combined with.
Sometimes some elements under columns 13 to 16 also can have a different charge, depending on which elements they are combined with.
Examples: In FeO, Fe has a charge of -2
But in Fe_2O_3 (the formula for "rust"), Fe has a charge of +3
in PbS, Pb has a charge of +2 But in $PbPO_4$, Pb has a charge of +3
6. You can only put one kind of positive and one kind of negative together.
Therefore you can't write a formula with Na and K and Ca and Cl andO together. You should just try to match one kind of positive element with one kind of negative element.
7. Some groups of elements come together and have an overall charge.
Examples: OH together has an overall charge of -1,
CO_3 a charge of -2, PO_4 a charge of -3
These groups take some time to learn, and therefore are usually given to students ahead of time so they know which elements come together on their own make these groups

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Complete the combinations below that would make a neutral molecule. The first few are done for you as an example.
For some questions, you must use the given name to determine what the combination was.

COMBINATION	ANSWER		CHEMICAL FORMULA	CHEMICAL NAME
+1 with -1	+1	-1		
K with Cl	K	Cl	KCl	Potassium chloride
+3 with -1	+3	-1 -1 -1		
Al with F	Al	F F F	AlF_3	Aluminum Fluoride
+1 with -2	+1 +1	-2		
Na with O	Na Na	O	Na_2O	Sodium oxide
+2 with -1	+2	-1 -1		
Mg with Cl	Mg	Cl Cl	$MgCl_2$	Magnesium chloride
+3 with -3	+3	-3		
Al with N	Al	N	AlN	Aluminum nitride
+2 with -2	+2	-2		
Cu with CO_3	Cu	CO_3	$CuCO_3$	Copper carbonate
+2 with -3	+2 +2 +2	-3 -3		
Ca with N	Ca Ca Ca	N N	Ca_3N_2	Calcium nitride
+3 with -2	+3 +3	-2 -2 -2		
B with O	B B	O O O	B_2O_3	Boron oxide

Make as many more combinations of elements you can, using the table on the first page, or using different elements from the periodic table:

The answers are limitless! Here are a few:

K_3P K_3N K_3PO_4 $FeCO_3$ $CuCO_3$ $SnCO_3$ $Al_2(CO_3)_3$

CO_2 H_2O $CoCl_2$ CH_4 $CaCO_3$ $NaCl$

Carbon dioxide | water | cobalt chloride | methane (Bunsen Burner!) | calcium carbonate (chalk) | sodium chloride (salt)