How do you write Chemical Formulas?

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Chemical Formula

A chemical formula of a compound is defined as a symbolic representation or notation of atoms constituting an element. The chemical or molecular formula identifies the number of particular <u>atoms</u> of each element present in a compound.



The molecular formula depends on the combining capacity or <u>valency of the elements</u>. Therefore valency is used to find how the atoms of an element will combine with the atom(s) of another element to form a chemical compound.

Sometimes in chemical formula <u>subscripts</u> are also used to represent the ratio of elements in the ionic or non molecular compounds. In case of <u>ionic compounds</u>, chemical formulas are termed as Empirical Formulas.

Following steps are taken to write chemical formula of any compound:

- Write down the symbol of an element
- Write down the valency of each of the element
- Cross over the valency

For example: Formula of Hydrogen chloride





The valency of Hydrogen and chlorine is one, therefore molecular formula for hydrochloric acid is written as Hcl

Beside the above steps, following three rules must be followed while writing a chemical formula

Rules for writing Chemical Formula

Rule 1:

The valency or charges present on the ion must balance each other.

For example

1. Formula for water: The valency of hydrogen is 1 and that of oxygen is 2. Therefore 2 H atom is required to balance single oxygen atom. Therefore chemical formula for water is written as H_2O



rorinua n₂O

2. Formula for Magnesium Chloride: As the charges on magnesium and chloride ion is 2+ and 1- respectively. Therefore 2 chloride ions are required to balance single magnesium ion.



Rule 2:

When a metal and non metal constitute a <u>chemical compound</u>, then the symbol of metal is written before the symbol of non metal.



1. Formula for Sodium chloride: As sodium is a metal and oxygen is a non metal therefore sodium is written first while oxygen is written after it.

Symbol	Na	Cl
Charge	1+	1-
Formula	NaCl	

Rule 3:

When polyatomic ions form a chemical compound, the number of atoms is written after enclosing the polyatomic ion in brackets.

For example:

1.Formula of calcium hydroxide: The formula of calcium hydroxide is written as Ca(OH)2 .Here, the bracket around OH with a subscript 2 indicates that there are two hydroxyl (OH) groups joined to one calcium atom.



Formula Ca(OH)2

(OH)2

2. Formula of calcium carbonate: In this example, brackets are not required as it contains only one ion.



Chemical Formula for other Compounds

Other examples:

Formula for Aluminum Chloride:

Symbol	Al	Cl	
		3-3-3	

Charge 3+ 1-

Formula AlCl₃

Formula for Copper Nitrate



Formula for Aluminum Sulphate



Formula for Calcium Oxide: As the valency of calcium and oxygen is same but to simplify the formula we write CaO instead of Ca₂O₂.



Formula CaO

Write the chemical formula of Magnesium carbonate, Phosphorus penta chloride, and Hydrogen sulphate.

Try to answer. Still need help? Want to know more about writing chemical formulas? <u>Click here</u> to schedule live help from a certified tutor!

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Reference Links:

- <u>http://www.vaxasoftware.com/doc_eduen/qui/valencia.pdf</u>
- <u>http://en.wikipedia.org/wiki/Ionic_compound</u>
- <u>http://www.shiva-group.com/images/rt.jpg</u>
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