

# cmol v 2.0

**Calculations on chemical formulas:** molar mass , conversions from grams to moles, molecules, volume of gas... Centesimal composition, empirical formula..

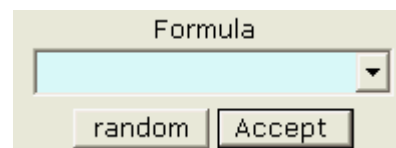
The screenshot displays the CMOL v 2.0 software interface with the following sections:

- Formula:** AgClO4 (silver perchlorate). Includes a calculator for molar mass calculation:  $107.87 + 35.453 + 15.999 * 4$ , resulting in a molar mass of 207.32 g/mole.
- Composition - Empirical / molecular formula:** Shows a table with C: 2.4 and H: 0.5. The calculated molar mass is 58.015.
- Gas molar mass calc.:** Inputs: d = 2.59 g/l, P = 1, T = 273 K. Includes buttons for "Save composition" and "Save formula".
- Conversions:** Shows conversions between grams (56), moles (2.70e-1), and molecules (1.62e23). Includes a gas conversion section with 1 mol = 22.4 L.
- P, V, T units conversion:** Shows conversions for Pressure (780 mm, 103.99 kPa, 1.0263 atm), Volume (6.78e-4 m³, 678 cm³, 6.78e-1 L), and Temperature (25 C, 77.000 F, 298.15 K).

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- [Centesimal composition](#)
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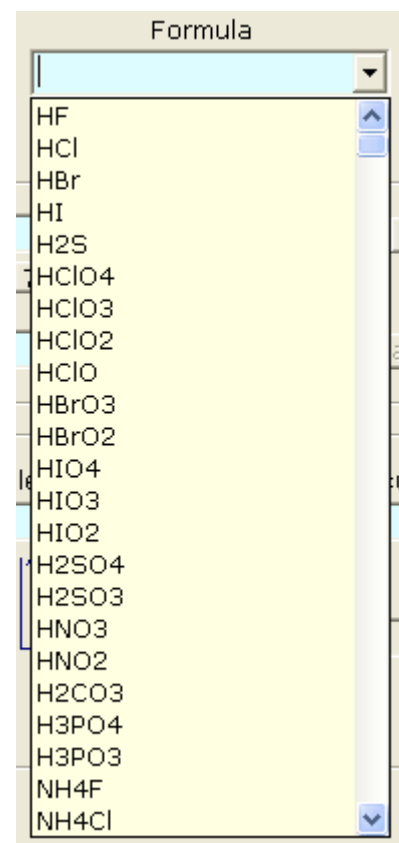
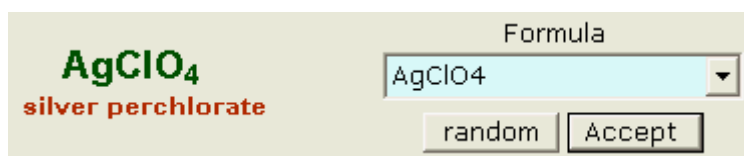
## Introducing / selecting / generating a formula

You can introduce the formula manually (without keeping in mind the format of subindexes, etc) whenever all their elements are in the database (which you can edit and enlarge)



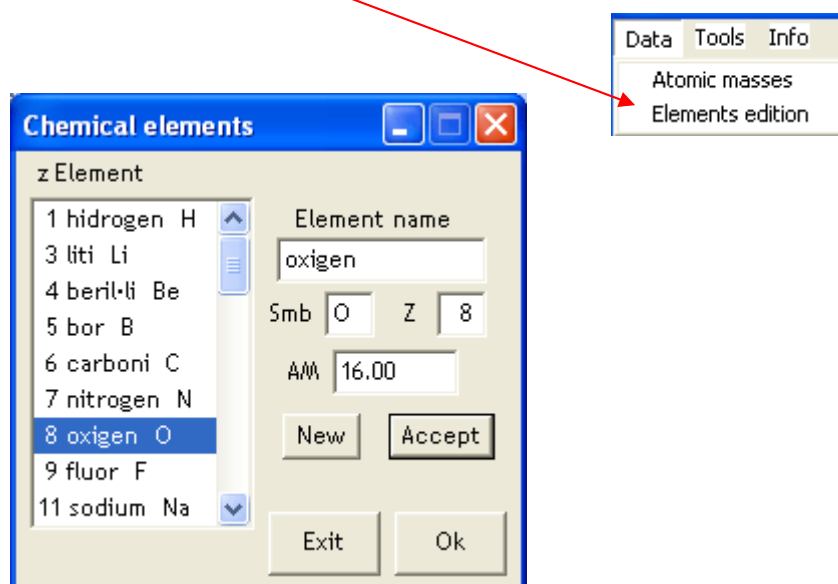
It can also be selected from the listbox or selected at random by the program. In both cases the compound's name will be shown.

In all cases the formatted formula will be shown at the left:



## Data

The calculations with the formulas use a database of elements that you can edit/enlarge with the option of the menu...



## Calculation of the molar mass

An option is to perform the calculation and to check the result with the button **verify**. Another is that the program calculates it by pressing the button **auto**.

Molar mass calculation (MM)

calc.:

Molar mass (MM)  g/mole

## Conversions grams, moles...

You can select the type (grams, moles, " molecules "..) of the data that should be converted to the other types with the mouse

If the substance is a gas (as CO<sub>2</sub>, CH<sub>4</sub>, etc...) you can activate the checkbox to also perform calculations of volume ( in S.C. and at any P and T)

Conversions

grams  moles  "molecules"

$\xleftrightarrow{1\text{mol: MM g}}$    $\xleftrightarrow{1\text{mol: }6.02 \cdot 10^{23}}$

gas  $\xleftrightarrow{1\text{mol: }22.4 \text{ L}}$

L. (s.c)   $\xleftrightarrow{\text{P, T}}$   L.  $\xleftrightarrow{\text{P, T}}$

L.  $\xleftrightarrow{\text{P, T}}$   atm  $\xleftrightarrow{\text{P, T}}$   K

You can enter a data or generate it at random and the conversions will be shown.

Results can be saved in a text file.

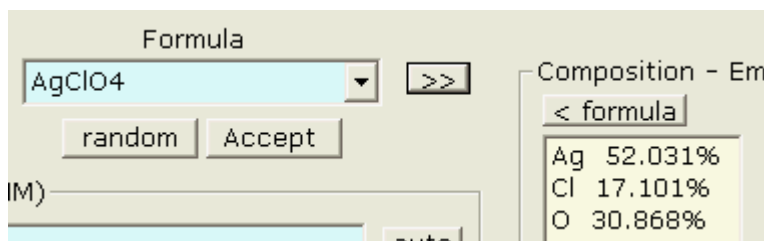
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### Note:

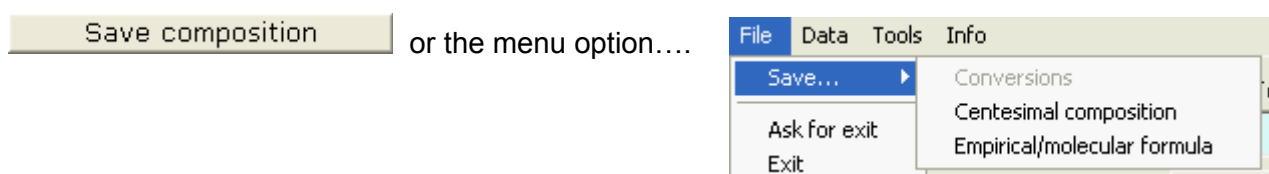
(\*): Ionic compounds (salts,...) aren't formed by actual molecules, but by groups of ions of opposite sign that are the smallest units of the compound. Always we can say "formulas".

## Centesimal composition

Once set a formula you can obtain its centesimal composition clicking on the button  :



The result can be saved in (or added to, if it already exists) a text file by means the button

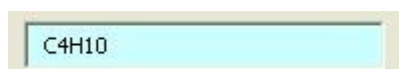


## Empirical / molecular formula

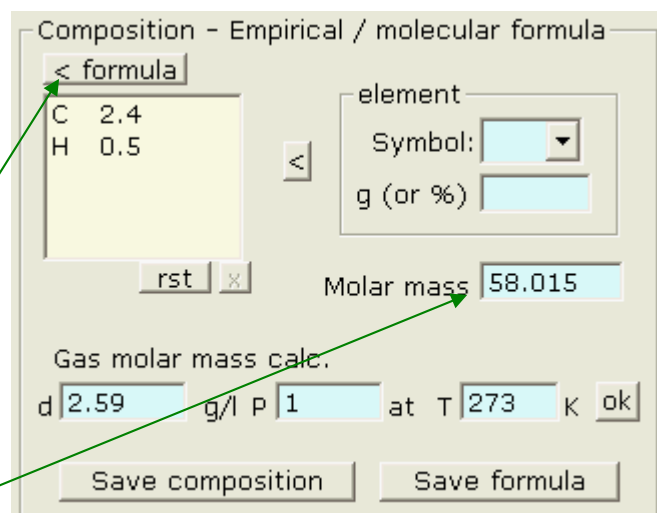
It can be obtained here:

Elements are entered or selected from the list, and also their amounts.

Once all elements are entered, clicking on the formula will be calculated and shown:



This will be the *empirical* (the simplest) or, if you have specified a molar mass, the *molecular* formula.



Molar mass of gaseous compounds can be calculated from their density (or from grams and volume expressed as a quotient) at certain pressure and temperature.

Also here the case can be saved in a text file...

## P, V, T units conversion

At this frame you can convert units of:

- Pressure: mm Hg (or Torr) ↔ kPa ↔ atm ,
- Volume: m<sup>3</sup> ↔ cm<sup>3</sup> (or ml) ↔ L (or dm<sup>3</sup> )
- Temperature: °C ↔ °F ↔ °K

by entering a value in the suitable textbox + **return**.

The converted units will be shown in the other textboxes of the same row.

P,V,T units conversion						
P:	<input type="text" value="780"/>	mm	<input type="text" value="103.99"/>	kPa	<input type="text" value="1.0263"/>	atm
V:	<input type="text" value="6.78e-4"/>	m <sup>3</sup>	<input type="text" value="678"/>	cm <sup>3</sup>	<input type="text" value="6.78e-1"/>	L
T:	<input type="text" value="25"/>	C	<input type="text" value="77.000"/>	F	<input type="text" value="298.15"/>	K