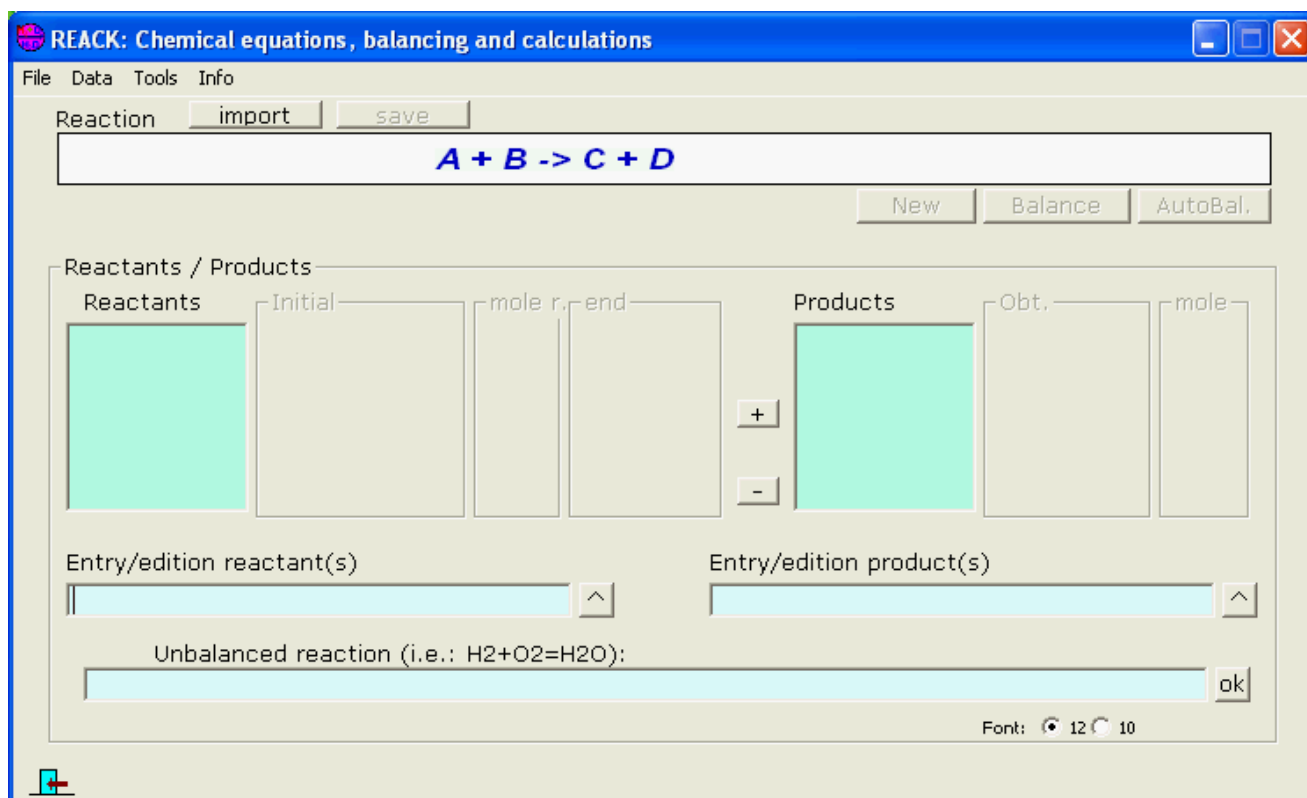


REACK

Balancing and calculations on chemical equations



- [Reactions: importing and editing](#)
- [Balancing a reaction](#)
- [Calculations on a chemical equation](#)
- [Problem](#)

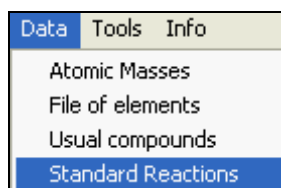
Reactions: importing and editing

Only are supported “molecular” (not ionic) reactions, and they only may consist in formulas and coefficients (not other indications)

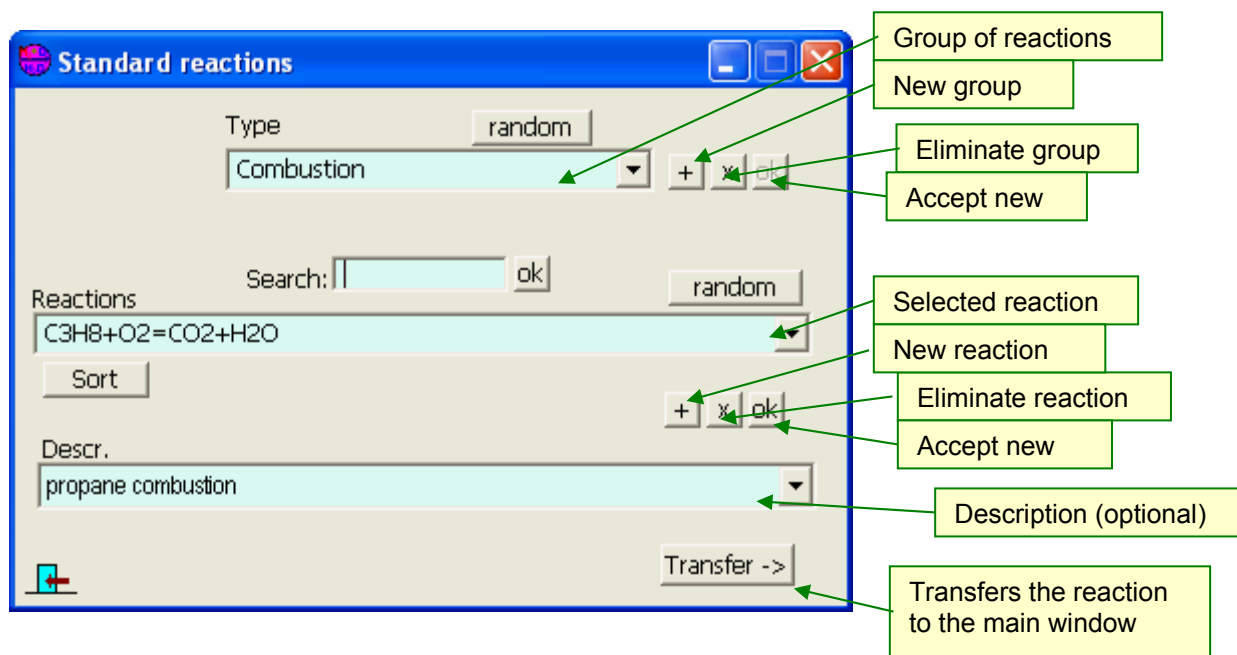
- [Importing standard reactions](#)
- [Building /editing manually a chemical equation](#)

Importing standard reactions

Clicking on the menu **Data** the option...



the window that connects with the database of standard reactions is shown



As you can see, here it's possible also modify and eliminate reactions and groups of them.

Building / editing manually a chemical equation

Introducing the reactants and products in their textboxes, the (not balanced) chemical equation will be formed. Also you can enter the full reaction.

An option to introduce formulas without writing them is to invoke the window of **usual compounds**...

Data	Tools	Info
Atomic Masses		
File of elements		
Usual compounds		
Standard Reactions		

Here you have these options:

- **Transfer** selected formula to the main window
- **Edit** formula (and name)
- **Erase** compound
- **New**: incorporate new compounds

Balancing a reaction

Once obtained a reaction, we must balance its equation so that it reflects the proportion in moles of the implied compounds.

Reaction

$\text{C}_3\text{H}_8 + \text{O}_2 \longrightarrow \text{CO}_2 + \text{H}_2\text{O}$

propane combustion

• [Manual balancing](#)

• [Autobalancing](#)

Manual balancing: Click on

Then, the textboxes to introduce the coefficients of reactants and products are shown.

Reaction

$\text{C}_3\text{H}_8 +$ $\text{O}_2 \longrightarrow$ $\text{CO}_2 +$ H_2O

propane combustion

Clicking on the program will accept the balance if it is correct or it will show error messages if not .

Autobalancing: Clicking on the program will calculate the coefficients.

This option is not advisable from the point of view of learning, but it will be useful when you want to pass directly to the phase of calculations.

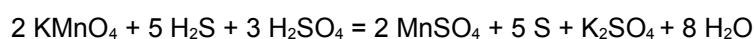
Anyway, you'll obtain the balanced equation:

Reaction

$\text{C}_3\text{H}_8 + 5 \text{O}_2 \longrightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$

propane combustion

Note about autobalancing: the method is purely mathematical and, although rarely, in the Redox reactions can give a result mathematically correct but chemically false, that is: such that the number of electrons given by the reducer is different from the one captured by the oxidizer. An example: The reaction $\text{KMnO}_4 + \text{H}_2\text{S} + \text{H}_2\text{SO}_4 = \text{MnSO}_4 + \text{S} + \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$, if balanced by the mathematic method gives $2 \text{KMnO}_4 + 2 \text{H}_2\text{S} + 2 \text{H}_2\text{SO}_4 = 2 \text{MnSO}_4 + \text{S} + \text{K}_2\text{SO}_4 + 4 \text{H}_2\text{O}$, that is compliant with the mass conservation, but balanced by the ion-electron method yields the chemically actual equation:



Calculations based on a (balanced) reaction:

Once balanced the equation, clicking on **Calculations** the textboxes for introduce data and present results will be shown.

You can introduce data of:

- One or more reactants (if more than one, the limiting reactant will be calculated).
- Or only one product (if more, they will be ignored).

The units of those (grams by default) can also be chosen here.

REACK: Chemical equations, balancing and calculations

File Data Tools Info

Reaction

$\text{C}_3\text{H}_8 + 5 \text{O}_2 \longrightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$

propane combustion

Calculations on the reaction

Reactants	Initial	mole r.	end	Products	Obt.	mole
C3H8	50 g			CO2		
O2	200 L sc			H2O		

A.M.: C =12.01, H =1.008, O =16.00

UnitsO2 ☐ gram ☐ mol ☐ solution V ☐ L sc ☐ L sc ☐ L sc ☐ L sc

ok

P: 1.00 atm T: 20.0 °C

Clicking on **Calc** after the introduction, results are shown in the empty textboxes:

REACK: Chemical equations, balancing and calculations

File Data Tools Info

Reaction

$\text{C}_3\text{H}_8 + 5 \text{O}_2 \longrightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$

propane combustion

Calculations on the reaction

Reactants	Initial	mole r.	end	Products	Obt.	mole
C3H8	50 g	1.13	0.000g	CO2	150 g	3.40
O2	200 L sc	5.67	73.0L sc	H2O	81.7 g	4.54

A.M.: C =12.01, H =1.008, O =16.00

UnitsO2 ☐ gram ☐ mol ☐ solution V ☐ L sc ☐ L sc ☐ L sc ☐ L sc

ok

P: 1.00 atm T: 20.0 °C

Problem: Clicking on **Problem >** the problem will be shown:

Problem

File

Statement

C3H8 reacts with O2 to give: CO2 and H2O.
 If they are implied 24.0 g of C3H8 and 86.0 L sc of O2 calculate:
 L to 1.40atm and 503°K of CO2 and g of H2O obtained.

Resolution

REACTION: $\text{C}_3\text{H}_8 + 5 \text{O}_2 = 3 \text{CO}_2 + 4 \text{H}_2\text{O}$

=====

Data:

C3H8: 24.0 g x 1 mole/44.10g = 0.544 mole <- Limiting R.
 O2: 86.0 L sc x 1 mole/22.4L = 3.84 mole / 5 -> 0.768

Results:

REACTANT	react. moles	- amount	excess (=
ini-reac.)			
O2	0.544x5 = 2.72x 22.4L/mole = 61.0L sc		-> 25.0 L sc final

PRODUCT	moles	amounts
CO2	0.544x3 = 1.63	x R x503.0K/1.40atm L/mole = 48.1 L
H2O	0.544x4 = 2.18	x18.02g/mole = 39.2 g

It can be saved in a text file. If the file already exists the problem will be added to it, and if not it will be created.

Problem

File

- Save problem
- View file
- Exit

Saving the reaction:

The entered reaction can be saved in the reactions database clicking on **save** :

SAVE REACTION

Select TYPE or create + **ok**

Type random

Search: **ok** random

Reactions

CH3CH2OH+O2=CO2+H2O

Sort

Optional: enter Description

Accept with **ok**

Descr.

Transfer ->

Concentrations calculation

Option of **Tools** menu.

By selecting a compound from the list we can calculate, from the data of preparation of a solution their different expressions of concentration.

Also a form of concentration can be converted to others.

Tools	Info
Concentrations calculation	
Tools edition	
NotePad	
Windows calculator	

Solution Concentrations

File

Compound: HCl MM: 36.46

Solution density: 1.06 g/ml

Preparation

g solute: 50
solution ml: 500
solvent g: 480

Concentration

Molarity: 2.74
molality: 2.86
g/l: 100
Percent: 10.4

OK Calc

To convert a form of concentration to others: Enter it and click **Calc**

Send any comment, suggestion or questions to:

jog@scialt.com

More apps in the web: <http://www.scialt.com/en>