# ChemBalance
for TI-83/84 [Plus]

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ChemBalance is a program to automatically balance any chemical equation. Instead of the trial-and-error method that is sometimes taught, it uses an algebraic method. (Information on this method at http://en.wikipedia.org/wiki/Chemical equation#Linear system balancing)

Instructions

As an example of how to use the program, I'll use the equation
$$Mg_3N_2 + H_2SO_4 \rightarrow MgSO_4 + (NH_4)_2SO_4$$

1. Start the program by pressing PRGM and selecting BALANCE, or through a shell like MirageOS.
2. The calculator will ask you how many molecules are on the left and right sides of the equation, and how many different elements there are in the equation. In my example, there are two molecules on the left (Mg_3N_2 and H_2SO_4), two molecules on the right ($MgSO_4$ and $(NH_4)_2SO_4$), and five different elements (Mg, N, H, and S, and O).

```
How many
molecules are on
the left? 2
the right? 2
How many
different
elements are in
the equation? 5
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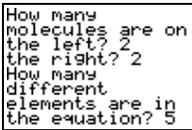
3. The calculator will tell you to number each molecule and element. The numbers do not refer to the atomic number of each element, but the order in which they appear in the equation. In the example, Mg_3N_2 is Molecule 1, H_2SO_4 is Molecule 2, and so on. Similarly, Mg is Element 1, N is Element 2, and so on. You will not need to memorize or write these numbers down—if you forget which is which, you can find it again by counting.

```
How many atoms
of Element 1 in
Molecule 1?
3
```

4. Enter the number of atoms of each element are in each molecule. In the example, there are three atoms of Element 1 (Mg) in Molecule 1 (Mg_3N_2). If you make a mistake, type a negative number or a non-integer to get a menu of options.
5. After you've finished, the calculator will show a list of coefficients. (Use the arrow keys to scroll left and right, if necessary.) They are in order of the molecules in the equation. In my example, the calculator gives {1 4 3 1}, meaning that the balanced equation is
$$Mg_3N_2 + \mathbf{4}H_2SO_4 \rightarrow \mathbf{3}MgSO_4 + (NH_4)_2SO_4$$
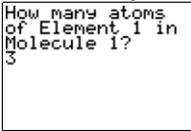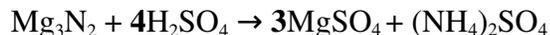
This program has been tested on a TI-84 Plus, but it should work on any calculator in the 83/84 series.

This program is locked by default, but you can read or edit my code using MirageOS or a locking/unlocking utility.

As far as I know, this program has no errors. However, it hasn't been extensively tested. If you find errors please e-mail me at ira.hanson@charter.net. (It helps if you tell me what you did before finding this error.) You can also send any comments or suggestions to the same address.