

Balancing (net) chemical reaction - some tips

You will also find some instructions at:

http://serc.carleton.edu/research_education/equilibria/balancingmetareactions.html

An example:

The plagioclase Iherzolite to spinel Iherzolite transition in the system CMAS (CaO-MgO-AlO_{1.5}-SiO₂)

In this case, the minerals to balance will *probably* be (*but we **may not need both** olivine and orthopyroxene!*):

Plag (an): $\text{CaAl}_2\text{Si}_2\text{O}_8$, Spinel: MgAl_2O_4 , Cpx (di): $\text{CaMgSi}_2\text{O}_6$, Opx (en): MgSiO_3 , Ol (fo): Mg_2SiO_4

IMPORTANT: The upper mantle **does not** contain oxides like CaO, MgO, SiO₂ and Al₂O₃

Another important observation is that Opx and Ol have Mg/Si-ratios of 1 and 2, respectively. You may have to use this information to balance many reactions.

To start, put plag and spinel as reactant and product, respectively (the task is to write the reaction from pl- to sp-lhz):



We lack Ca and Si as products and Mg as reactant. We have 0 Mg + 2 Si on the reactant side, and one formula unit of the Ca-bearing mineral Cpx, which we need on the product side, will bring that side to 2 Mg + 2 Si.

Therefore, we try with:



We need more Si as product. Therefore, we try with:



Looks quite good, but the Mg/Si-ratios are now: 2/3 (reactants) and 3/3 (products).

Therefore we simply **double Ol and Opx**:



and then: **balanced!**