

Balancing Chemical Equations

Follow these steps to balance chemical equations:

1. Write the skeleton equation with the correct chemical formulas
 - a. There are 7 elements that exist as diatomic molecules when elemental (*i.e. not combined with other elements and not ions*): H₂, O₂, F₂, Br₂, I₂, N₂ and Cl₂ (the “HOFBRINCL’s”). When in compounds they can have any appropriate subscript, and when present as ions (e.g. O²⁻, Cl⁻), they have NO subscript.
2. Take inventory of your elements and *unchanging* polyatomic ions in your reactants and in your products
3. Change the coefficients (and your inventory) until you have the same numbers of elements and polyatomic ions on each side. Some important rules:
 - a. Never, ever, EVER change the chemical formula (*i.e.* the subscripts). While this might lead to equal numbers, you are guaranteed to get the problem wrong.
 - b. Any coefficient multiplies ALL of the atoms in a formula.
 - c. Begin with one of the following:
 - i. Start with the most complex compound (most subscripts)
 - ii. Elements that are in only one product and one reactant
 - iii. The compound with the most elements
 - iv. An element with odd and even subscripts on opposite sides (swap subscripts as the coefficients—form the least common multiple).
 - v. Save elements (including HOFBRINCL’s) for last.
 - d. Reduce coefficients to lowest whole-number ratio.
4. Check your work: recount the atoms and polyatomic ions on both sides.

Examples in notes:

