3. Balancing Chemical Equations

A. Law of Conservation of Mass

mass cannot be created or destroyed in a chemical reaction

mass of reactants = mass of products

in terms of balancing, you MUST have the same # of atoms of each element on both sides of the equation.

B. Balancing

use COEFFICIENTS to balance equations

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numbers written in front of a formula that multiply through every element in that formula.

Examples

1. $3\,CuCl_2(aq) + 2\,Al(s) \rightarrow 3\,Cu(s) + 2\,AlCl_3(aq)$

Cu	3	Cu	3
Cl	6	Cl	6
Al	2	Al	2

2. $N_2(g) + 3\,H_2(g) \rightarrow 2\,NH_3(g)$

N	2	N	2
H	6	H	6

3. $3\,H_2SO_4(aq) + 2\,Cr(OH)_3(s) \rightarrow 6\,H_2O(l) + Cr_2(SO_4)_3(aq)$

H	~~5~~ 12	~~2~~ 12
S	~~+3~~	3
O	~~7~~ 18	~~13~~ 18
Cr	~~+2~~	2

4. $3\,Na_2CO_3(aq) + 2\,AlF_3(s) \rightarrow Al_2(CO_3)_3(s) + 6\,NaF(aq)$

Na	~~2~~ 6	~~+2~~ 6
(CO_3)	~~+3~~	3
Al	~~+2~~	2
F	~~3~~ 6	~~+6~~

5. $2\,C_4H_{10}(l) + 6.5\,O_2(g) \rightarrow 4\,CO_2(g) + 5\,H_2O(g)$

C	~~4~~ 8	~~+4~~ 8
H	10 20	~~2~~ 10 20
O	~~2~~ 13 26	~~3~~ 13 26