Polyatomic ions

ammonium	NH_4^+
sulfate	SO_4^{2-}
hydrogen sulfate	HSO_4^-
sulfite	SO_3^{2-}
nitrate	NO_3^-
nitrite	NO_2^-
phosphate	PO_4^{3-}
hydrogen phosphate	HPO_4^{2-}
dihydrogen phosphate	$H_2PO_4^-$
phosphite	PO_3^{3-}
hydroxide	OH^-
peroxide	O_2^{2-}
acetate	$C_2H_3O_2^-$
perchlorate	ClO_4^-
chlorate	ClO_3^-
chlorite	ClO_2^-
hypochlorite	ClO^-
chromate	CrO_4^{2-}
dichromate	$Cr_2O_7^{2-}$
permanganate	MnO_4^-
cyanide	CN^-
cyanate	CNO^-
thiocyanate	SCN^-
carbonate	CO_3^{2-}
hydrogen carbonate/bicarbonate	HCO_3^-
oxalate	$C_2O_4^{2-}$
thiosulfate	$S_2O_3^{2-}$
hydronium	H_3O^+

Useful constants

1 mole = 6.022×10^{23}

Molarity of water = 1

Useful molar masses

Water	18.02
Carbon dioxide(CO_2)	44.01
Sodium chloride(NaCl)	58.44
Hydrochloric acid (HCl)	36.46
Sodium hydroxide (NaOH)	39.99
Silver chloride (AgCl)	143.32
Aluminum oxide (Al_2O_3)	101.96
Sulfuric acid (H_2SO_4)	98.08
Phosphoric acid(H_3PO_4)	97.99
Hydrogen peroxide (H_2O_2)	34.01
Potassium chlorate ($KClO_3$)	122.55
Calcium hydroxide($Ca(OH)_2$)	74.09
Nitrogen dioxide (NO_2)	46.01
Ammonia(NH_3)	17.03

Solubility rules

1. All compounds with alkali metals are soluble
2. All compounds with ammonium(NH_4^+) are soluble
3. All compounds with nitrate(NO_3^-), chlorate(ClO_3^-), and perchorate(ClO_4^-) are soluble
4. Most carbonate(CO_3^{-2}), phosphate(PO_4^{-3}), and sulfide (S^{-2}) compounds are insoluble, except with alkali or ammonium.
5. Most hydroxide(OH^-) compounds are insoluble, except $Ba(OH)_2$ and alkali hydroxide compounds.
6. Most compounds with Cl^-, Br^-, and I^- are soluble, except when with Ag^+, Hg_2^{+2}, and Pb^{+2}.
7. Most sulfate (SO_4^{-2}) compounds are soluble, except with Ba^{+2}, Hg^{+2}, and Pb^{+2}

Types of equations

Combustion

General form: $C_aH_b + O_2 \rightarrow CO_2 + H_2O$

Example: $C_5H_{12} + O_2 \rightarrow CO_2 + H_2O$

Synthesis

General form: $A + B \rightarrow A_aB_b$

Example: $2Na + Cl_2 \rightarrow 2NaCl$

Decomposition

General form: $A_aB_b \rightarrow A + B$

Example: $H_2CO_3 \rightarrow H_2O + CO_2$

Single displacement

General form: $AB + C \rightarrow AC + B$

Example: $2\ Fe_2O_3 + 3\ C \rightarrow Fe + CO_2$

Double displacement

General form: $AB + CD \rightarrow AC + BD$

Example: $2NaOH + FeCl_2 \rightarrow 2NaCl + Fe(OH)_2$

Equations

Molarity (M) x Volume (V) = mol

moles x molar mass = grams

Mole ratios are the coefficient ratios in a chemical equation.
They represent the ratios of moles that are needed to fuel a reaction and the number of moles that are produced from the reaction.

Dilution: $M_1V_1 = M_2V_2$

Percents

Percent yield: theoretical yield/actual yield

Percent mass: grams calculated/grams of sample

Error

Absolute error: |calculated value - actual value|

Relative error/percent error: |calculated value - actual value|/actual value

Percent yield + error = 100%

Concentration:

By mass: grams of solute/grams of solution

By volume: vol of solute/vol of solution

Molarity: moles of solute/L of solution