

Metric Scale

Giga (G)			Mega (M)			kilo (k)	hecto (h)	deca (da)	Basic Unit	deci (d)	centi (c)	milli (m)			micro (μ)			nano (n)
1000000000	100000000	10000000	1000000	100000	10000	1000	100	10	1	0.1	0.01	0.001	0.0001	0.00001	0.000001	0.0000001	0.00000001	0.000000001
10 ⁹	10 ⁸	10 ⁷	10 ⁶	10 ⁵	10 ⁴	10 ³	10 ²	10 ¹	length meter (m) mass: gram (g) volume: liter (L) time: second (s)	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶	10 ⁻⁷	10 ⁻⁸	10 ⁻⁹

Scientific Measurement

Length
1 inch = 2.54 centimeters
1 mile = 1.61 kilometers

Mass
1 kilogram = 2.204 pounds
1 ounce = 28.35 grams

Volume
1 gallon = 4.55 Litres
1 millilitre = 1 centimeter cubed

Area
1 hectare = 10000 meters squared = 2.47 acres

Temperature Conversions

$K = C + 273$ $C = \frac{5}{9} (F - 32)$ $F = \frac{9}{5} (C) + 32$ C = Celsius
K = Kelvin
F = Fahrenheit

Atomic Structure

Average Atomic Mass = (mass)(abundance) + (mass)(abundance)...

Gases

1.00 atm = 760 mm Hg = 101325 Pa

$P = \frac{F}{A}$ $F = PA$ $A = \frac{F}{P}$ P= pressure (Pa)
F= force (N)
A = area (m²)

$P_1V_1 = P_2V_2$ $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

P = pressure (atm or Pa)
V = volume (L or mL)

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1 mole = 22.4 L at STP

$PV = nRT$

P = pressure (Pa or atm)
V = volume (L)
n = moles (mol)
R = 0.0821 L atm/mol K or 8314 L Pa/mol K
T = temperature (K)

Density

$D = \frac{m}{V}$

$V = \frac{m}{D}$

$m = D \times V$

D = Density (g/mL or g/cm³)
m = mass (g)
V = Volume (mL or cm³)

Substance	Density (g/mL or g/cm ³)
water	1.00
ethanol	0.800
aluminum	2.70
iron	7.86
lead	11.34
gold	19.30
tin	7.31
silver	10.50
chromium	7.20
copper	8.95

Acids and Bases

$pH = -\log[H^+]$
 $[H^+] = 10^{-pH}$

$pOH = -\log[OH^-]$
 $[OH^-] = 10^{-pOH}$

$pH + pOH = 14.00$
 $[H^+] [OH^-] = 1.0 \times 10^{-14}$

Solutions

$C = \frac{n}{V}$

$n = CV$

$V = \frac{n}{C}$

C = concentration (M)
n = number of moles (mol)
V = volume of solution (L)

$C_1V_1 = C_2V_2$

C₁ = initial concentration (M)
V₁ = initial volume (L)
C₂ = final concentration (M)
V₂ = final volume (L)

Solubility Table

Soluble >0.1 M at 25 °C Insoluble <0.1 M at 25 °C

Anion	Cation	Solubility
All	Alkali ions: Li ⁺ , Na ⁺ , K ⁺ , Rb ⁺ , Cs ⁺ , Fr ⁺	Soluble
All	Hydrogen ion: H ⁺	Soluble
All	Ammonium ion: NH ₄ ⁺	Soluble
Nitrate, NO ₃ ⁻ or Chlorate, ClO ₃ ⁻ or Hypochlorite, ClO ⁻ or Perchlorate, ClO ₄ ⁻ or Acetate, C ₂ H ₃ O ₂ ⁻	All	Soluble
Chloride, Cl ⁻ or Bromide, Br ⁻ or Iodide, I ⁻	All others Ag ⁺ , Pb ²⁺ , Cu ⁺	Soluble Insoluble
Fluoride, F ⁻	All others Mg ²⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺ , Pb ²⁺	Soluble Insoluble
Sulphide, S ²⁻	Alkali ions, H ⁺ , NH ₄ ⁺ , Be ²⁺ , Mg ²⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺	Soluble
	All others	Insoluble
Hydroxide, OH ⁻	Alkali ions, H ⁺ , NH ₄ ⁺ , Ba ²⁺ , Sr ²⁺	Soluble
	All others	Insoluble
Sulphate, SO ₄ ²⁻	All others Ag ⁺ , Ca ²⁺ , Sr ²⁺ , Ba ²⁺ , Pb ²⁺	Soluble Insoluble
Oxalate, C ₂ O ₄ ²⁻ or Phosphate, PO ₄ ³⁻ or Carbonate, CO ₃ ²⁻ or Sulphite, SO ₃ ²⁻	Alkali ions, H ⁺ , NH ₄ ⁺	Soluble
	All others	Insoluble

