Chemistry Reference Sheet

$(NH_4)^+$	**Ammonium**	$(IO_3)^-$	Iodate
$(C_2H_3O_2)^-$	**Acetate**	$(NO_3)^-$	**Nitrate**
$(AsO_4)^{3-}$	Arsenate	$(NO_2)^-$	Nitrite
$(HCO_3)^-$	Bicarbonate	$(C_2O_4)^{2-}$	Oxalate
$(BrO_3)^-$	Bromate	$(ClO_4)^-$	Perchlorate
$(CO_3)^{2-}$	**Carbonate**	$(MnO_4)^-$	Permanganate
$(ClO_3)^-$	**Chlorate**	$(O_2)^{2-}$	Peroxide
$(ClO_2)^-$	Chlorite	$(PO_4)^{3-}$	**Phosphate**
$(CrO_4)^{2-}$	Chromate	$(PO_3)^{3-}$	Phosphite
$(CN)^-$	Cyanide	$(SO_4)^{2-}$	**Sulfate**
$(Cr_2O_7)^{2-}$	Dichromate	$(SO_3)^{2-}$	Sulfite
$(OH)^-$	**Hydroxide**	$(SCN)^-$	Thiocyanate
$(ClO)^-$	Hypochlorite		

Common Metric Prefixes

(K) Kilo - 10^3	**Base - 10^0**	**(m)** Milli - 10^{-3}	**(p)** Pico - 10^{-12}
(H) Hecto - 10^2	**(d)** Deci - 10^{-1}	**(μ)** Micro - 10^{-6}	**(f)** Fempto - 10^{-15}
(Da) Deca - 10^1	**(c)** Centi - 10^{-2}	**(n)** Nano - 10^{-9}	**(a)** Atto - 10^{-18}

Roman Numerals

for multiple cation metal charges

I - One	VI - Six
II - Two	VII - Seven
III - Three	VIII - Eight
IV - Four	IX - Nine
V - Five	X - Ten

Prefixes

covalent bonding only

1 - Mono	6 - Hexa	**Hydrocarbons**:
2 - Di	7 - Hepta	1 - meth
3 - Tri	8 - Octa	2 - eth
4 - Tetra	9 - Nona	3 - prop
5 - Penta	10 - Deca	4 - but

Conversion Factors Used in Calculations

Mole Conversions

1 mole = molar mass (g)
1 mole = 6.022 x 10^{23} atoms, molecules, particles, f.units
1 mole = 22.4 L of **gas** (@STP)

STP (Standard Temperature and Pressure)

1 atm = 760 Torr = 760 mm Hg = 101.3 kPa = 14.7 psi **0°C**

Thermochemistry:

1 calorie (cal) = 4.184 Joule (J)
1000 calories (cal) = 1 Calorie (Cal)
Specific Heat of Liquid Water 4.184 J/g°C

Miscellaneous Conversion Factors:

1 g = 0.03527 oz.	1 ft^3 = 28.32L	1 km = 1000m
1 mile = 5280 ft.	1 cm^3 = 1 mL	100 cm = 1m
1 mile = 1.61 km	1 kg = 2.2 lb	1000 mm = 1m
1 L = 1.058 qt	1 lb = 453.6 g	2.54 cm = 1 in.

Activity Series of Metals and Nonmetals

Lithium	Fluorine
Potassium	Chlorine
Calcium	Bromine
Barium	Iodine
Calcium	
Sodium	
Magnesium	
Aluminum	
Manganese	
Zinc	
Chromium	
Iron	
Cobalt	
Nickel	
Tin	
Lead	
(Hydrogen)	
Copper	
Mercury	
Silver	
Platinum	
Gold	

Decreasing Reactivity

Formulas

see also "Conversion Factors Used in Calculations" section

Molarity, Dilution and Solution Concentration

$$Molarity(M) = \frac{\text{moles of solute (mol)}}{\text{Liters of solution (L)}} \qquad \%Conc. = \frac{solute(g)}{solution(g)} \times 100$$

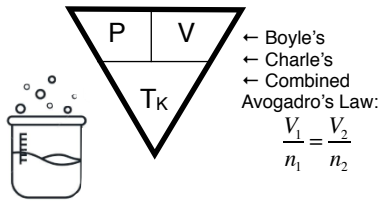
$$Dilution:\ M_1V_1 = M_2V_2\ (V\ in\ mL\ or\ L) \qquad solution = solute + solvent$$

Ideal Gas Law & Gas Triangle: *PV = nRT*

P = pressure (atm)
V = volume (L)
n = number of moles
R = gas constant [0.0821 $\frac{L \cdot atm}{mol \cdot K}$]
T = temperature (K)

Dalton's Law of Partial Pressures:

$P_{Total} = P_1 + P_2 \ldots P_n$



Thermochemistry

Calorimetry: ***q = m c ΔT*** ***$q_{gained} = -q_{lost}$*** ***mcΔT = -mcΔT***

q = heat/energy (J or cal); +q = absorbed, -q = released
m = mass (g)
C_p = specific heat capacity (J/g°C or cal/g°C)
ΔT = change in temperature (°C, $\Delta T = T_{final} - T_{initial}$)

Enthalpy and Entropy:

$$\Delta H_f^o = \sum H_f^o(products) - \sum H_f^o(reactants)$$

$$\Delta S^o = \sum S^o(products) - \sum S^o(reactants)$$

Spontaneity:

$$\Delta G = \Delta H - T\Delta S$$

Miscellaneous:

$$Density = \frac{mass(g)}{volume(mL)} \qquad \%Error = \left|\frac{(true\ value - measured\ value)}{true\ value}\right| \cdot 100\%$$

$$\%Yield = \frac{Actual}{Theoretical} \times 100$$

Equilibrium & Acid-Base

$$K_{eq} = \frac{[C]^x[D]^y}{[A]^m[B]^n}$$

$$pH = -\log[H^+]$$

$$pOH = -\log[OH^-]$$

$$pH + pOH = 14$$

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

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

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

pH and pOH

pH Scale

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Acid ←7→ *Base*

pOH Scale

14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Temp. Conversions

°F = (9/5)°C + 32
°C = (°F - 32)(5/9)
K = 273 + °C
°C = K - 273