

GENERAL CHEMISTRY PRO-KNOWLEDGE

8/19/10

Common Metric Prefixes and Units		
Unit	Symbol	Conversions
Meter	m	1 m = 39.37 inches
Centimeter	cm	1 inch = 2.54 cm exactly
Angstrom	Å	1 Å = 1×10^{-10} m
Gram	g	1 g = 0.002205 lb
Liter	L	1 L = 1000 cm ³ = 1 dm ³ = 1.056710 qt
Kelvin	K	K = (°C + 273.15)
kilo	k	10 ³
deci	d	10 ⁻¹
centi	c	10 ⁻²
milli	m	10 ⁻³
micro	μ	10 ⁻⁶
nano	n	10 ⁻⁹
pico	p	10 ⁻¹²

Nomenclature

Common Cations		
Charge	Formula	Name
1+	H ⁺	Hydrogen ion
	H ₃ O ⁺	Hydronium ion
	Alkali metal ⁺	Alkali metal ion
	NH ₄ ⁺	Ammonium ion
	Ag ⁺	Silver ion
	Cu ⁺	Copper(I)
2+	Alkaline earth metal ²⁺	Alkaline earth metal ion
	Zn ²⁺	Zinc ion
	Co ²⁺	Cobalt(II)
	Cu ²⁺	Copper(II)
	Fe ²⁺	Iron(II)
	Mn ²⁺	Manganese(II)
	Hg ₂ ²⁺	Mercury(I)
	Hg ²⁺	Mercury(II)
	Ni ²⁺	Nickel(II)
	Pb ²⁺	Lead(II)
	Sn ²⁺	Tin(II)
3+	Al ³⁺	Aluminum ion
	Cr ³⁺	Chromium(III)
	Fe ³⁺	Iron(III)

Common Anions		
Charge	Formula	Name
1-	H ⁻	Hydride ion
	F ⁻	Fluoride ion
	Cl ⁻	Chloride ion
	Br ⁻	Bromide ion
	I ⁻	Iodide ion
	CN ⁻	Cyanide ion
	OH ⁻	Hydroxide ion
	NO ₃ ⁻	Nitrate
	NO ₂ ⁻	Nitrite
	HCO ₃ ⁻	Hydrogen carbonate or bicarbonate ion
	HSO ₄ ⁻	Hydrogen sulfate ion

Charge	Formula	Name
1-	ClO ₄ ⁻	Perchlorate ion
	ClO ₃ ⁻	Chlorate ion
	ClO ₂ ⁻	Chlorite ion
	ClO ⁻	Hypochlorite ion
	MnO ₄ ⁻	Permanganate ion
	H ₂ PO ₄ ⁻	Dihydrogen phosphate ion
2-	C ₂ H ₃ O ₂ ⁻ (or CH ₃ COO ⁻)	Acetate ion
	O ²⁻	Oxide ion
	S ²⁻	Sulfide ion
	SO ₄ ²⁻	Sulfate ion
	SO ₃ ²⁻	Sulfite ion
	CO ₃ ²⁻	Carbonate ion
3-	Cr ₂ O ₇ ²⁻	Dichromate ion
	HPO ₄ ²⁻	Hydrogen phosphate
	PO ₄ ³⁻	Phosphate ion

Other Compounds	
Formula	Name
H ₂ O	Water
NH ₃	Ammonia
CH ₄	Methane (natural gas)
O ₃	Ozone
H ₂ O ₂	Hydrogen peroxide
H ₂ , N ₂ , O ₂ , F ₂ , Cl ₂ , Br ₂ , I ₂ ,	Diatom molecules
He, Ne, Ar	Noble gases
(N ₂ O ₅ , dinitrogen pentoxide)	All simple binary covalent compounds

Acids	
Formula	Name
HNO ₃	Nitric acid (strong)
H ₂ SO ₄	Sulfuric acid (strong)
HCl	Hydrochloric acid (strong)
HBr	Hydrobromic acid (strong)
HI	Hydroiodic acid (strong)
HClO ₄	Perchloric acid (strong)
H ₃ PO ₄	Phosphoric acid (weak)
H ₂ CO ₃	Carbonic acid (weak)
HC ₂ H ₃ O ₂ (or CH ₃ COOH)	Acetic acid (weak)

Bases	
Formula	Name
Group 1A metal hydroxides such as NaOH	Group 1A metal hydroxides (strong) Sodium hydroxide
Group 2A heavy metal hydroxides such as Ca(OH) ₂	Group 2A metal hydroxides (strong) Calcium hydroxide
NH ₃	Ammonia (weak)
NR ₃	Other amines (weak)
Anions (X ⁻)	Conjugate bases of weak acids

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Alkanes (C _n H _{2n+2})	
Formula	Name
CH ₄	Methane
C ₂ H ₆	Ethane
C ₃ H ₈	Propane
C ₄ H ₁₀	Butane
C ₅ H ₁₂	Pentane
C ₆ H ₁₄	Hexane
C ₇ H ₁₆	Heptane
C ₈ H ₁₈	Octane
C ₉ H ₂₀	Nonane
C ₁₀ H ₂₂	Decane

Electrolytes and Dissociation

Electrolytic Behavior			
	Strong Electrolyte	Weak Electrolyte	Non-electrolyte
Dissociation	Complete (→)	Partial (⇌)	None
Soluble Ionic Compounds	All	None	None
Molecular Compounds	Strong Acids	Weak acids and bases	All Others

A Few Solubility Rules

Solubility Guidelines for Ionic Compounds in Water	
Soluble when containing:	Exceptions:
Alkali metal ions (group 1A)	None
NH ₄ ⁺	None
NO ₃ ⁻	None
C ₂ H ₃ O ₂ ⁻ (or CH ₃ COO ⁻)	None
Cl ⁻ , Br ⁻ , I ⁻	Ag ⁺ , Hg ₂ ²⁺ , Pb ²⁺
Insoluble when containing:	Exceptions:
Ions with charges 2+/- or higher*	See above

* There are many exceptions.

Activity Series

Activity (oxidation) Series	
Al, Mg, Na, Ca, K, Li	Most easily oxidized (most active)
Zn	
Fe	
Sn	
H ₂ (g)	
Cu	
Au, Ag, Pt	Least easily oxidized (least active)