

## GENERAL CHEMISTRY PRO-KNOWLEDGE

### Nomenclature

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

### Common Anions

Charge	Formula	Name
1-	H <sup>-</sup>	Hydride ion
	F <sup>-</sup>	Fluoride ion
	Cl <sup>-</sup>	Chloride ion
	Br <sup>-</sup>	Bromide ion
	I <sup>-</sup>	Iodide ion
	CN <sup>-</sup>	Cyanide ion
	OH <sup>-</sup>	Hydroxide ion
	NO <sub>3</sub> <sup>-</sup>	Nitrate
	HCO <sub>3</sub> <sup>-</sup>	Hydrogen carbonate or bicarbonate ion
	HSO <sub>4</sub> <sup>-</sup>	Hydrogen sulfate ion
	ClO <sub>4</sub> <sup>-</sup>	Perchlorate ion
	ClO <sub>3</sub> <sup>-</sup>	Chlorate ion
	ClO <sub>2</sub> <sup>-</sup>	Chlorite ion
	ClO <sup>-</sup>	Hypochlorite ion
	H <sub>2</sub> PO <sub>4</sub> <sup>-</sup>	Dihydrogen phosphate ion
	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> (or CH <sub>3</sub> COO <sup>-</sup> )	Acetate ion
2-	O <sup>2-</sup>	Oxide ion
	S <sup>2-</sup>	Sulfide ion
	SO <sub>4</sub> <sup>2-</sup>	Sulfate ion
	CO <sub>3</sub> <sup>2-</sup>	Carbonate ion
	HPO <sub>4</sub> <sup>2-</sup>	Hydrogen phosphate
3-	PO <sub>4</sub> <sup>3-</sup>	Phosphate ion

### Other Compounds

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

### Acids

Formula	Name
HNO <sub>3</sub>	Nitric acid (strong)
H <sub>2</sub> SO <sub>4</sub>	Sulfuric acid (strong)
HCl	Hydrochloric acid (strong)
HBr	Hydrobromic acid (strong)
HI	Hydroiodic acid (strong)
HClO <sub>4</sub>	Perchloric acid (strong)
H <sub>3</sub> PO <sub>4</sub>	Phosphoric acid (weak)
H <sub>2</sub> CO <sub>3</sub>	Carbonic acid (weak)
HC <sub>2</sub> H <sub>3</sub> O <sub>2</sub> (or CH <sub>3</sub> COOH)	Acetic acid (weak)
All cations, except group 1A, Ca <sup>2+</sup> , Sr <sup>2+</sup> , Ba <sup>2+</sup>	

### 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) <sub>2</sub>	Group 2A metal hydroxides (strong) Calcium hydroxide
NH <sub>3</sub>	Ammonia
NR <sub>3</sub>	Other amines
Anions (X <sup>-</sup> )	Conjugate bases of weak acids

### Alkanes (C<sub>n</sub>H<sub>2n+2</sub>)

Formula	Name
CH <sub>4</sub>	Methane
C <sub>2</sub> H <sub>6</sub>	Ethane
C <sub>3</sub> H <sub>8</sub>	Propane
C <sub>4</sub> H <sub>10</sub>	Butane
C <sub>5</sub> H <sub>12</sub>	Pentane
C <sub>6</sub> H <sub>14</sub>	Hexane
C <sub>7</sub> H <sub>16</sub>	Heptane
C <sub>8</sub> H <sub>18</sub>	Octane
C <sub>9</sub> H <sub>20</sub>	Nonane
C <sub>10</sub> H <sub>22</sub>	Decane

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### *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 <sub>4</sub> <sup>+</sup>	None
NO <sub>3</sub> <sup>-</sup>	None
C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> <sup>-</sup> (or CH <sub>3</sub> COO <sup>-</sup> )	None
Cl <sup>-</sup> , Br <sup>-</sup> , I <sup>-</sup>	Ag <sup>+</sup> , Hg <sub>2</sub> <sup>2+</sup> , Pb <sup>2+</sup>
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 <sub>2</sub> (g)	
Cu	
Au, Ag, Pt	Least easily oxidized (least active)