Chemistry 121 – Names and Formulas

1. Names + spellings + symbols for these elements:

non-metals		main group metals + U		transition metals	
hydrogen	H	lithium	Li	scandium	Sc
helium	He	sodium	Na	titanium	Ti
carbon	C	potassium	K	vanadium	V
nitrogen	N	rubidium	Rb	chromium	Cr
oxygen	O	cesium	Cs	manganese	Mn
fluorine	F			iron	Fe
neon	Ne	beryllium	Be	cobalt	Co
		magnesium	Mg	nickel	Ni
phosphorus	P	calcium	Ca	copper	Cu
sulfur	S	strontium	Sr	zinc	Zn
chlorine	Cl	barium	Ba	palladium	Pd
argon	Ar			silver	Ag
				cadmium	Cd
selenium	Se	aluminum	Al	tungsten	W
bromine	Br	gallium	Ga	osmium	Os
krypton	Kr	bismuth	Bi	platinum	Pt
				gold	Au
iodine	I			mercury	Hg
xenon	Xe			lead	Pb
				tin	Sn
radon	Rn	uranium	U		

metalloids (main group only)

boron	B				
	silicon	Si			
	germanium	Ge	arsenic	As	
			antimony	Sb	
				tellurium	Te

2. Names and formulas/charges of positive ions (cations)
***with only one possible charge*:**

Note that the word "ion" is part of each name, because these names without that word means "the neutral metal."

a. Monatomic Cations: Name⟶Formula or Formula⟶Name

Main group species (first two columns and last six columns of periodic table):

always 1+		always 2+		always 3+	
H^+	hydrogen ion (proton)				
Li^+	lithium ion	Be^{2+}	beryllium ion		
Na^+	sodium ion	Mg^{2+}	magnesium ion	Al^{3+}	aluminum ion
K^+	potassium ion	Ca^{2+}	calcium ion		
Rb^+	rubidium ion	Sr^{2+}	strontium ion		
Cs^+	cesium ion	Ba^{2+}	barium ion		

Transition metal cations (middle 10 columns of periodic table):

Ag^+	silver ion	Zn^{2+}	zinc ion
		Cd^{2+}	cadmium ion

Other transition metals have multiple possibilities for charges, see #3, below.

b. Polyatomic Cations:

H_3O^+	hydronium ion (often abbreviated as H^+)
NH_4^+	ammonium ion
Hg_2^{2+}	mercury(I) ion (it's a *dimer* of Hg^+, two Hg^+ always couple together!)

3. Names of metallic cations with multiple charge possibilities:

Metal ions with more than one possible charge are named by explicitly indicating the charge—via a Roman numeral in parentheses. Some examples are listed here. You need to be able to identify any metal ion for metals listed in number 1, above, for example…in $AuCl_3$ you would identify the gold(III) ion, Au^{3+}.

Cu^+	copper(I) ion	Fe^{2+}	iron(II) ion	Hg_2^{2+}	mercury(I) ion
Cu^{2+}	copper(II) ion	Fe^{3+}	iron(III) ion	Hg^{2+}	mercury(II) ion

You need to be able to go from formula to name or from name to formula.

Note that the mercury(I) ion has two Hg together, making it 2+, not 1+.

4. Names and formulas of common anions (negatively charged ions):

You need to be able to translate from Name⟶Formula and from Formula⟶Name
Note that formula includes charge!

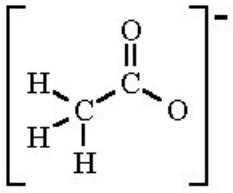
a. Monatomic Anions

1- charge	**2- charge**	**3- charge**
Group 17:	Group 16:	Group 15:
H^- hydride		
F^- fluoride	O^{2-} oxide	N^{3-} nitride
Cl^- chloride	S^{2-} sulfide	P^{3-} phosphide
Br^- bromide		
I^- iodide		

b. Polyatomic Anions

1- charge	**2- charge**	**3- charge**
OH^- hydroxide	O_2^{2-} peroxide	PO_4^{3-} phosphate
CN^- cyanide	SO_3^{2-} sulfite	
OCN^- cyanate	SO_4^{2-} sulfate	
SCN^- thiocyanate	$S_2O_3^{2-}$ thiosulfate	
NO_2^- nitrite	CrO_4^{2-} chromate	
NO_3^- nitrate	$Cr_2O_7^{2-}$ dichromate	
MnO_4^- permanganate	CO_3^{2-} carbonate	
	$C_2O_4^{2-}$ oxalate	
ClO^- hypochlorite		
ClO_2^- chlorite	HCO_3^- hydrogen carbonate or bicarbonate	
ClO_3^- chlorate	HSO_4^- hydrogen sulfate	
ClO_4^- perchlorate		

$CH_3CO_2^-$ or $C_2H_3O_2^-$ acetate (first formula shows the connectivity better)



5. Traditional names and formulas of five *molecules*:

H_2O	water
CH_4	methane
N_2O	nitrous oxide
O_3	ozone
C_{60}	buckminsterfullerene

Note that all of these atoms are non-metals.

6. Names and formulas and strengths of common acids and bases:

Memorize all names, formulas and strengths (strong or weak) of the acids and bases listed here:

Strong Acids		Strong Bases	
HCl	hydrochloric acid	NaOH	sodium hydroxide
HBr	hydrobromic acid	KOH	potassium hydroxide
HI	hydroiodic acid	$Ba(OH)_2$	barium hydroxide
HNO_3	nitric acid		
$HClO_4$	perchloric acid		
H_2SO_4	sulfuric acid		
Weak Acids		**Weak Base**	
HF	hydrofluoric acid	NH_3	ammonia[10]
CH_3COOH	acetic acid		
H_3PO_4	phosphoric acid		