NAMING CHEMICAL COMPOUNDS

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Oxidation numbers

Group 1 (alkali: Li, Na, K, Rb, Cs, Fr)	+1 (always)
Group 2 (Be, Mg, Ca, Sr, Ba, Ra)	+2 (always)
Group 13 (B, Al, Ga, In, Tl)	+3 (always)
Group 3 (Sc, Y)	+3 (always)
Group 14 (C, Si only)	+4 (always)
Group 15 (N, P, As)	-3 (with metals)
Group 16 (O, S, Se, Te, Po)	-2 (in binary compounds with metals)
Group 17 (halogens: F, Cl, Br, I, At)	-1 (in binary compounds with metals)
Ag Zn Cd	+1 (always) +2 (always) +2 (always)
Hg Hg_2	+2 mercury (II) +2 mercury (I)
Cu	+1 copper (I) *cuprous* +2 copper (II) *cupric*
Fe	+2 iron (II) *ferric* +3 iron (III) *ferrous*
Mn	+2 manganese (II) +3 manganese (III)
Co	+2 cobalt (II) +3 cobalt (III)
Cr	+2 chromium (II) +3 chromium (III)
Sn	+2 tin (II) +4 tin (IV)
Pb	+2 lead (II) +4 lead (IV)

Hydrogen
Metal + H^-
H^+ + Nonmetal

Polyatomic anions	
NO_3^-	Nitrate
ClO_3^- (+ Br, I)	Chlorate
CO_3^{2-}	Carbonate
CrO_4^{2-}	Chromate
SO_4^{2-}	Sulfate
PO_4^{3-} (+ As)	Phosphate

Ionic compounds

(metal cation^{+} + nonmetal anion^{-} = salt)

CATION	ANION	NAME	EXAMPLES
X	Y (monoatomic)	XY-ide	NaCl: sodium chloride
X	Y (polyatomic anion)	XY-ate	$NaClO_3$: sodium chlorate
X	Y (polyatomic anion with one less oxygen)	XY-ite	$NaClO_2$: sodium chlorite
X	Y (polyatomic anion with two less oxygens)	X-hypoY-ite	NaClO: sodium hypochlorite
X	Y (polyatomic anion with one more oxygen)	X-perY-ate	$NaClO_4$: sodium perchlorate
X	O	X oxide	Cu_2O: copper(I) oxide CuO: copper(II) oxide
NH_4^+	Y	Ammonium Y-ide	NH_4Cl: ammonium chloride
X	OH^-	X hydroxide	KOH: potassium hydroxide
X	CN^-	X cyanide	NaCN: sodium cyanide
X	O_2^{2-}	X peroxide	Na_2O_2: sodium peroxide
X	N_3^-	X azide	NaN_3: sodium azide
X	NH_2^-	X amide	$NaNH_2$: sodium amide

- *If H_2O is present, add prefix + "hydrate". Example: $CaCl_2 \cdot 2H_2O$ calcium chloride dehydrate*
- *Same subscripts are omitted only in ionic compounds, not in covalent!*

Covalent compounds

ELEMENTS	NAME	EXAMPLES
Nonmetal X + Nonmetal Y (more electronegative)	prefixX prefixY-ide	CO_2: carbon dioxide N_2O_5: dinitrogen pent(a)oxide ClO_2: (mono)chlorine dioxide Na_2O: NOT A COVALENT COMPOUND!

Prefices

(mono-)	hexa-
di-	hepta-
tri-	octa-
tetra-	nona-
penta-	deca-

Exceptions

H_2O	Water
NH_3	Ammonia
CH_4	Methane

Acids (covalent compounds)

CATION	ANION	NAME	EXAMPLES
H^+	Nonmetal anion Y (-ide)	hydroY-ic acid	HCl: hydrochloric acid
H^+	Nonmetal polyatomic anion Y (-ate, per-ate)	Y-ic acid	HNO_3: nitric acid $HClO_4$: perchloric acid
H^+	Nonmetal polyatomic anion Y (-ite, hypo-ite)	Y-ous acid	HNO_2: nitrous acid HClO: hypochlorous acid

Organic compounds (hydrocarbons)

# of carbons in straight line	
1: meth-	6: hex-
2 : eth-	7: hept-
3: prop-	8: oct-
4: but-	9: non-
5: pent-	10: dec-

Kind of bonds	
-ane	Only single bonds
-ene	With double bond
-ine	With triple bond

Naming procedure:

1. Identify the longest unbroken carbon chain (main chain)
2. Count the number of carbons and find the appropriate **beginning**
3. Identify shorter branches (side chains) attached to the main chain (methyl-, ethyl, propyl- for chains with 1, 2, 3 carbons respectively)
4. Number the carbons of the main chain starting from the side closest to the main chain
5. Find to which carbon of the main chain are the side chains attached
6. Identify whether there are double/triple bonds, after which carbon of the main chain they are and find the appropriate **ending**
7. (carbon#)+(side chain)+beginning+(carbon#)+ending

Examples: