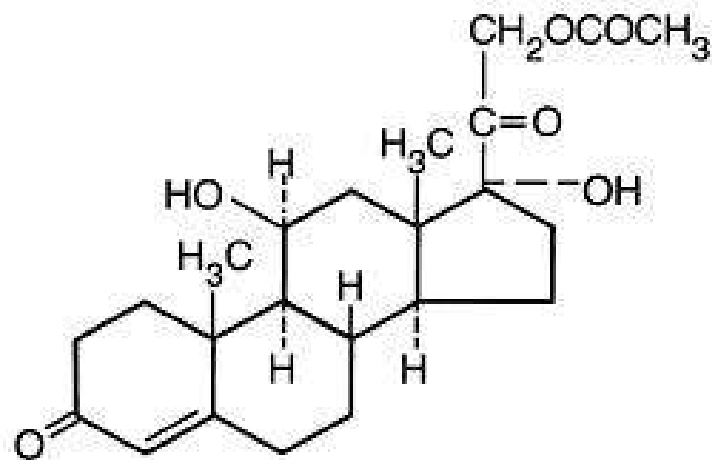


CHAPTER 9 – CHEMICAL NAMES AND FORMULAS



Jennie L. Borders

PERIODIC TABLE FOR NAMING

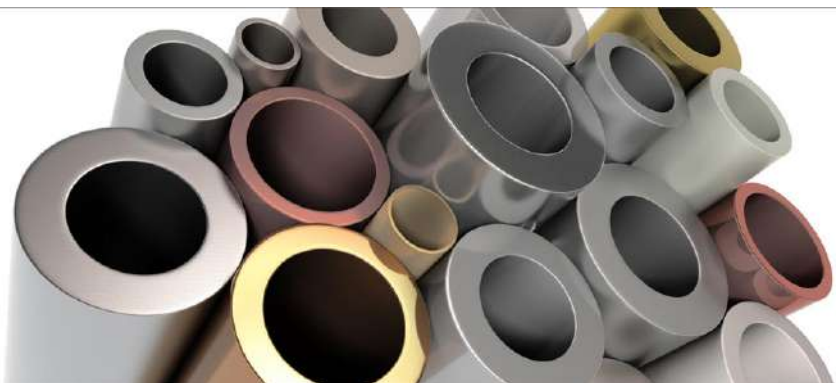
hydrogen 1 H 1.00794	Hydrogen Regular Metals Transition Metals Nonmetals																helium 2 He 4.002602
lithium 3 Li 6.941	beryllium 4 Be 9.012182	Key: element name atomic number symbol atomic weight										boron 5 B 10.811	carbon 6 C 12.0107	nitrogen 7 N 14.00674	oxygen 8 O 15.9994	fluorine 9 F 18.9984	neon 10 Ne 20.1797
sodium 11 Na 22.98977	magnesium 12 Mg 24.3050											aluminum 13 Al 26.981538	silicon 14 Si 28.0855	phosphorus 15 P 30.97376	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.984
potassium 19 K 39.0983	calcium 20 Ca 40.078	scandium 21 Sc 44.95591	titanium 22 Ti 47.867	vanadium 23 V 50.9415	chromium 24 Cr 51.9961	manganese 25 Mn 54.93805	iron 26 Fe 55.845	cobalt 27 Co 58.9332	nickel 28 Ni 58.6934	copper 29 Cu 63.546	zinc 30 Zn 65.409	gallium 31 Ga 69.723	germanium 32 Ge 72.64	arsenic 33 As 74.9216	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.798
rubidium 37 Rb 85.4678	strontium 38 Sr 87.62	yttrium 39 Y 88.90585	zirconium 40 Zr 91.225	niobium 41 Nb 92.90638	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.9055	palladium 46 Pd 106.42	silver 47 Ag 107.8682	cadmium 48 Cd 112.411	indium 49 In 114.818	tin 50 Sn 118.710	antimony 51 Sb 121.760	tellurium 52 Te 127.60	iodine 53 I 126.9045	xenon 54 Xe 131.293
cesium 55 Cs 132.90545	barium 56 Ba 137.327	lutetium 71 Lu 174.967	hafnium 72 Hf 178.49	tantalum 73 Ta 180.9479	tungsten 74 W 183.84	rhenium 75 Re 185.207	osmium 76 Os 190.23	iridium 77 Ir 192.217	platinum 78 Pt 195.078	gold 79 Au 196.96655	mercury 80 Hg 200.59	thallium 81 Tl 204.3833	lead 82 Pb 207.2	bismuth 83 Bi 208.980	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]
francium 87 Fr [223]	radium 88 Ra [226]	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	darmstadtium 110 Ds [271]	roentgenium 111 Rg [272]	ununbium 112 Uub [285]	ununquadium 114 Uuq [289]					

lanthanum 57 La 138.9055	cerium 58 Ce 140.116	praseodymium 59 Pr 140.90765	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.964	gadolinium 64 Gd 157.25	terbium 65 Tb 158.9253	dysprosium 66 Dy 162.50	holmium 67 Ho 164.930	erbium 68 Er 167.259	thulium 69 Tm 168.934	ytterbium 70 Yb 173.04
actinium 89 Ac [227]	thorium 90 Th 232.038	protactinium 91 Pa 231.0359	uranium 92 U 238.0289	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]



SECTION 9.1 REGULAR METALS REVIEW

- The regular metals include Group 1 (except H) and 2 and aluminum.
- When naming a compound that starts with a regular metal, name the first element and add -ide to the second element (except for polyatomic ions).
- When writing the formula, remember to balance charges.



SAMPLE PROBLEM

○ Write the name or formula for the following:

○ AlBr_3

Aluminum bromide

○ Sodium sulfate

Na_2SO_4



PRACTICE PROBLEMS

○ Write the name or formula for the following:

○ LiNO_3 Lithium nitrate

○ SrCl_2 Strontium chloride

○ Barium oxide BaO

○ Magnesium phosphate $\text{Mg}_3(\text{PO}_4)_2$



SECTION 9.2 – TRANSITION METALS REVIEW

- The transition metals are in Groups 3 – 12 and the triangle.
- When naming compounds that start with a transition metal, name the first element, add a roman numeral for the charge, and add –ide to the second element (except for polyatomic ions).
- When writing the formula, remember to balance charges.



OLD NAMES FOR TRANSITION METALS

- Remember that for the old naming system for transition metals, the -ic ending means the higher charge and the -ous ending means the lower charge.

Ion	Old Name
Fe ³⁺	ferric
Fe ²⁺	ferrous
Cu ²⁺	cupric
Cu ⁺	cuprous
Co ³⁺	cobaltic
Co ²⁺	cobaltous
Sn ⁴⁺	stannic
Sn ²⁺	stannous
Pb ⁴⁺	plumbic
Pb ²⁺	plumbous
Hg ²⁺	mercuric
Hg ₂ ²⁺	mercurous



SAMPLE PROBLEM

○ Write the name or formula for the following:

○ Fe_2O_3

Iron (III) oxide

○ Cupric sulfite

CuSO_3



PRACTICE PROBLEM

○ Write the name or formula for the following:

○ Zinc (II) permanganate



○ Cu_2O (old name)

Cuprous oxide



SECTION 9.3 – NONMETALS REVIEW

- The nonmetals are located to the right of the stair-step line on the periodic table.
- When naming compounds that start with nonmetals, use prefixes to indicate the number of atoms (except when the first element has 1 atom) and add -ide to the second element.
- When writing the formula do NOT balance charges, use the prefixes to find the subscripts.



SAMPLE PROBLEM

○ Write the name and formula for the following:

○ N_2O

Dinitrogen monoxide

○ Diphosphorus pentoxide

P_2O_5



PRACTICE PROBLEMS

○ Write the name and formula for the following.

○ CO Carbon monoxide

○ CCl₄ Carbon tetrachloride

○ Nitrogen trihydride NH₃

○ Phosphorous trichloride PCl₃



SECTION 9.4 – NAMING AND WRITING FORMULAS FOR ACIDS AND BASES

- An acid is a compound that produces H⁺ ions when it dissolves in water.
- The formula for an acid normally starts with and H.
- When naming acids, you should first determine whether or not the acid contains oxygen.



ACIDS THAT DO NOT CONTAIN OXYGEN

- If the acid does not contain oxygen, then you add the prefix hydro- and suffix is -ic. Also add acid at the end.
- Ex: HCl = **hydrochloric** acid



SAMPLE PROBLEM

○ Write the names of the following acids:

○ HF Hydrofluoric acid

○ HCN Hydrocyanic acid



PRACTICE PROBLEM

○ Write the names for the following acids:

○ HBr Hydrobromic acid

○ HI Hydroiodic acid



ACIDS THAT DO CONTAIN OXYGEN

- When an acid does contain oxygen, you must determine whether its polyatomic ion ends in -ate or -ite.
- If the polyatomic ion ends in -ate, then we change the ending to -ic. Ex: $\text{HNO}_3 = \text{NO}_3^- = \text{nitrate} = \text{nitric acid}$
- If the polyatomic ion ends in -ite, then we change the ending to -ous. Ex: $\text{HNO}_2 = \text{NO}_2^- = \text{nitrite} = \text{nitrous acid}$



SAMPLE PROBLEMS

○ Write the names of the following acids:

○ H_2SO_4 Sulfuric acid

○ H_3PO_4 Phosphoric acid

○ H_2SO_3 Sulfurous acid



PRACTICE PROBLEMS

○ Write the names for the following acids.

○ H_2CO_3 Carbonic acid

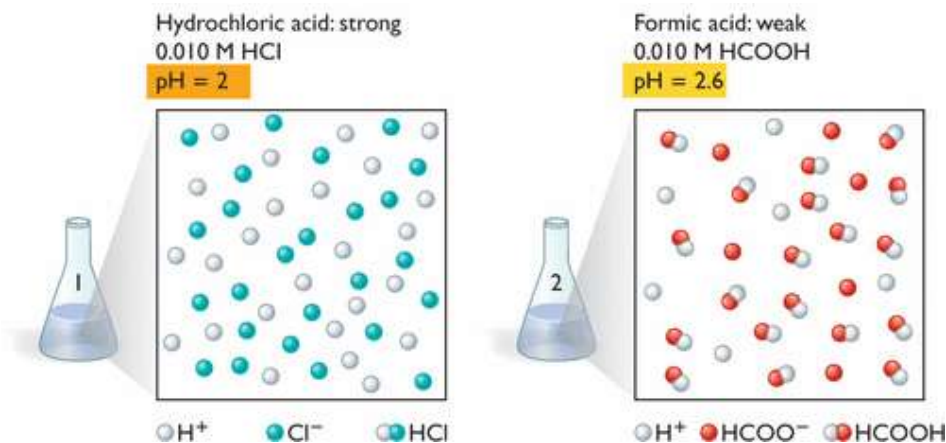
○ H_3PO_3 Phosphorous acid

○ HClO_2 Chlorous acid



WRITING THE FORMULAS FOR ACIDS

- When writing the formula for an acid always start with H even if it is not in the name.
- Remember to balance the charges.
- The ending -ic means that the polyatomic ion ends in -ate.
- The ending -ous means that the polyatomic ion ends in -ite.



SAMPLE PROBLEM

○ Write the formula for the following acids.

○ Hydrosulfuric acid H_2S

○ Hypochlorous acid HClO

○ Acetic acid $\text{HC}_2\text{H}_3\text{O}_2$



PRACTICE PROBLEMS

○ Write the formula for the following acids.

○ Perchloric acid HClO_4

○ Chromic acid H_2CrO_4

○ Oxalic acid $\text{H}_2\text{C}_2\text{O}_4$




WRITING THE NAMES AND FORMULAS FOR BASES

- A base is a compound that produces OH⁻ in water.
- When naming a base, you name it like any other compound that starts with a regular or transition metal. Ex: NaOH = sodium hydroxide
- When writing the formula for a base, remember to balance charges. Ex: magnesium hydroxide = Mg(OH)₂

The pH Scale



SECTION 9.4 ASSESSMENT

1. How are the formulas for acids determined?
 2. How are bases named?
 3. Give the name of HMnO_4 .
 4. Give the names of these bases.
 - a. LiOH
 - b. $\text{Pb}(\text{OH})_2$
 - c. $\text{Al}(\text{OH})_3$
 5. Identify each compound as an acid or a base.
 - a. $\text{Ba}(\text{OH})_2$
 - b. HClO_4
 - c. KOH
- 

SECTION 9.4 ASSESSMENT

6. Write the formula for the following compounds.
- carbonic acid
 - sulfurous acid
 - iron (III) hydroxide



THE
END

