

APES “CHEMISTRY REVIEW” NOTES: NAMES AND FORMULAS

- I. PERIODIC TABLE—schematic presentation of the elements according to their periodic properties, arranged by increasing atomic number
- A. general layout
- 1) GROUP—vertical column
 - a) REPRESENTATIVE ELEMENTS—group A elements
 - b) TRANSITION ELEMENTS—group B elements
 - c) INNER TRANSITION ELEMENTS (rare earth metals)—2 “footnotes”
 - 2) PERIOD—horizontal row (1-7)
- B. metals, nonmetals, and metalloids
- 1) metals
 - a) most of the periodic table is composed of metals
 - b) metal characteristics: luster, ductility, malleability, conductivity
 - 2) nonmetals
 - a) found in the upper right-hand corner of the chart
 - b) nonmetal characteristics: nonlustrous, poor conductors
 - 3) metalloids (semimetals, semiconductors)—elements having properties of metals and nonmetals (they border the staircase)

THE METALLOIDS: B, Si, Ge, As, Sb, Te, Po

(Al is classified as “other metal” and At is a nonmetal)

- C. a “staircase” divides the metals from the nonmetals
- D. common elements to know

Ag, Al, Ar, As, Au, B, Ba, Be, Bi, Br, C, Ca, Cl, Co, Cr, Cs, Cu, F, Fe, Fr, H, He, Hg, I, K, Kr, Li, Mg, Mn, N, Na, Ne, Ni, O, P, Pb, Ra, Rb, S, Sb, Si, Sr, Sn, U, W, Zn

- II. Atoms and Ions
- A. atomic charge: neutral (net charge of zero) # protons = # electrons
- B. ION—charged atom(s) or group of atoms
- 1) formed by gain or loss of electrons
 - 2) CATION— a positive ion formed by losing electrons
 - 3) ANION— a negative ion formed by gaining electrons
common ending is —IDE (chloride, bromide, iodide...)

**CP AN Cations Positive, Anions Negative “Cat People Are Nice”
YOU CAN’T LOSE OR GAIN PROTONS TO FORM AN ION!**

- 4) an ion has different properties than its element (Na atom vs. Na⁺ ion)

- III. Compounds
- A. COMPOUND (cmpd.)—a substance formed from more than one element
- B. MOLECULE—a group of atoms with no net charge
- C. two general types of cmpds.
- 1) MOLECULAR COMPOUND—composed of molecules
 - usually liquids or gases at room temp.
 - usually have a low melting point (m.p.) and boiling point (b.p.)
 - composed of nonmetals... like CO₂
 - 2) IONIC COMPOUNDS—composed of positive/negative ions (formula units)
 - usually crystalline solids at room temp.

VI. Polyatomic ions: a group of charged atoms; most end in *-ATE* or *-ITE*

VII. BINARY COMPOUNDS: BINARY IONIC & BINARY MOLECULAR

A. BINARY CMPD.—composed of two elements

- 1) compound composed of monatomic ions
- 2) net charge must be zero

B. crisscross formula method

- 1) write the symbols of the two ions next to each other
- 2) write the charges as superscripts
- 3) balance the formula by crisscrossing the numbers

C. BINARY IONIC CMPDS.—metal cation / nonmetal anion combination

- 1) name the cation first, then the anion (*-IDE* ending)
- 2) use Roman numerals if/when needed for the cation
- 3) examples:

CaBr₂ calcium bromide; KI potassium iodide; FeCl₃ iron(III) chloride

D. BINARY MOLECULAR CMPDS.—nonmetal / nonmetal combination

- 1) two nonmetallic elements
- 2) no ionic charges involved
- 3) ending in *-IDE*
- 4) prefixes used in naming:

MONO-, DI-, TRI-, TETRA-, PENTA-, HEXA-, HEPTA-, OCTA-, NONA-, DECA-
(mono- is not used on the first element)

- 5) examples:

CCl₄ carbon tetrachloride; BF₃ boron trifluoride; CO carbon monoxide

VIII. Ternary Ionic Compounds

A. TERNARY CMPD.—compound made up of three different elements

B. crisscross formula method for ions

C. examples:

Na₂SO₄ sodium sulfate; KMnO₄ potassium permanganate; Fe(OH)₃ iron(III) hydroxide

IX. Common Acids

ACIDS—compounds that donate H⁺ ions in solution HX → H⁺ + X⁻

acetic acid HC₂H₃O₂ or CH₃COOH

carbonic acid H₂CO₃

hydrochloric acid HCl

nitric acid HNO₃

phosphoric acid H₃PO₄

sulfuric acid H₂SO₄