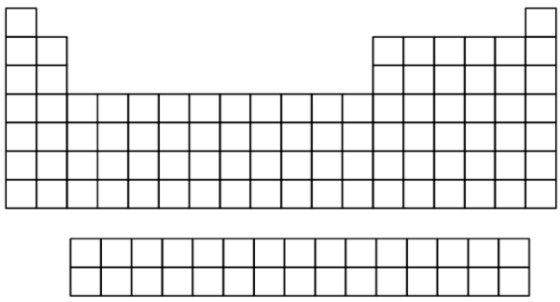
Periodic Table and Naming
Chapter 2
Sections 5-9

AP Chemistry

Periodic Table- Can you find these?

- Periods
- Groups/Families
- Metals
- Metalloids
- Non Metals
- Alkali Metals
- Alkaline Earth Metals
- Chalcogens
- Halogens
- Nobel Gases
- Diatomic Atoms
- Transition Metals
- Lanthanides Series
- Actinides Series
- s Orbitals
- p Orbitals
- d Orbitals
- f Orbitals

Periodic Table



Periodic Table- What's the trend?

- Metal Behavior
- Electronegativity
- Atomic radii
- Ionic radii
- Reactivity
- REMEMBER: Vertical relationships are more apparent than horizontal relationships

Naming Compounds

- There are two major types of chemical compounds: Organic (usually contain C, H and O) and inorganic
- Inorganic naming can be broken into four categories
  - Ionic Compounds
  - Molecular Compounds
  - Acids and bases
  - Hydrates

Ionic Compounds

- Ionic compounds contain a cation and an anion
- Binary ionic compounds
  - 2 elements
  - End in –ide
  - Transition metals need to have charge indicated using roman numerals except for…. ?
    - ***NOTE**: Older system of naming uses "-ous" and "-ic" ending like ferrous(Fe^{2+}) and ferric (Fe^{3+}) just like polyatomic ions *augmentation to your education**
- Ternary Compounds
  - 3 elements- usually contains a polyatomic ion

Common Polyatomic Ions-Page

- NH_4^+
- $C_2H_3O_2^-$
- CO_3^{2-}
- ClO_3^-
- ClO_2^-
- CrO_4^{2-}
- CN^-
- $Cr_2O_7^{2-}$
- $H_2PO_4^-$
- H^-
- HCO_3^-
- HPO_4^{2-}
- HSO_4^-
- OH^-
- NO_3^-
- NO_2^-
- O^{2-}
- MnO_4^-
- O_2^{2-}
- PO_4^{3-}
- SO_4^{2-}
- S^{2-}
- SO_3^{2-}
- SCN^-

Additions of Common Ions- Pg 61

Per-	-ate	+1 oxygen	ClO_4^-
	-ate	Base	ClO_3^-
	-ite	-1 oxygen	ClO_2^-
Hypo-	-ite	-1 oxygen	ClO^-
	-ide	No oxygens	Cl^-
Hydrogen	-ate	add 1 hydrogen	HPO_4^{2-}
	Can add 2 hydrogen, then becomes dihydrogen		$H_2PO_4^-$
Thio-	-ate	add sulfur	SCN^-

Practice

- KH_2PO_4
- K_2HPO_4
- Li_2CO_3
- NH_4NO_2
- NaSCN
- Cadmium Iodide
- Lead (III) hydroxide
- Cesium carbonate
- Iron (III) phosphate
- Mercury (I) Iodide

Molecular Compounds

- Many molecular compounds are binary
  - Two nonmetals
  - two elements on the right hand side of the stair step ladder
  - Hydrogen as well
- Naming Rules
  - Prefix (omit mono)
  - Element
  - Prefix (always)
  - Element with ending –ide

Prefixes- Table 2.6 Pg 65

1. Mono
2. Di
3. Tri
4. Tetra
5. Penta
6. Hexa
7. Hepta
8. Octa
9. Nona
10. Deca

Important Note

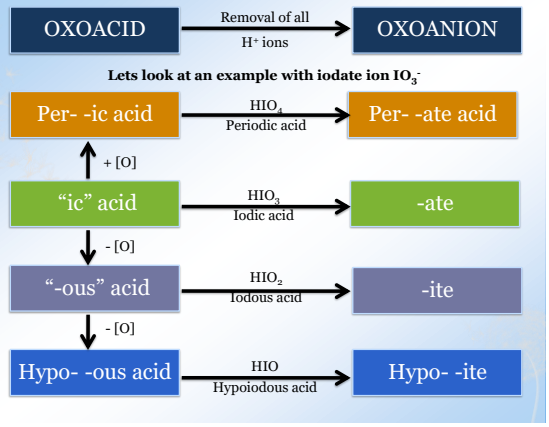
- 9 Special elements
  - 7 Diatomic elements
  - S_8
  - P_4
- Allotropes
  - One of two or more distinct forms of an element
  - Example:
    - Oxygen (O_2) and Ozone (O_3)

Practice

- Phosphorus pentafluoride
- Iodine heptafluroide
- Tetraphosphorus hexaoxide
- Boron trichloride
- Sulfur trioxide
- N_2O_4
- $SiCl_4$
- P_4O_{10}
- Cl_2O_7
- NF_3

Acids

- Acids can be described as a substance that yields a H^+ ion when dissolved in water
- Two types: Binary acid and Oxoacids (ternary)
  - Binary acids: 2 elements, hydro-anion-ic acid (HCl)
  - Oxoacids acids- Acids that contain H, O and another element(central element)
    - Remember…
      - "-ic" acids come from "–ate"
      - "-ous" acids come from "-ite"



Practice

- HBr
- HI
- HClO
- $HClO_2$
- $HClO_3$
- $HClO_4$
- Hydrocyanic acid
- Phosphoric acid
- Phosphorous acid
- Hypophosphorous acid

Bases

- A base can be described as a substance that yields a OH^- when dissolved in water
- Most bases are hydroxides
  - NaOH
  - KOH
  - $Ba(OH)_2$
- Another common base which is a molecular compound in the gaseous or liquid phase is …. NH_3
  - $\mathbf{NH_3 + H_2O \leftrightarrow NH_4OH}$

Hydrates

- Hydrates are compounds that have a specific number of water molecules attached to them.
- The purpose of this week's lab is to determine the formula of a hydrate
- Name these compounds following the same rules but at the end use the Greek prefix + hydrate
  - $BaCl_2 \cdot 2H_2O$
  - $LiCl \cdot H_2O$
  - $MgSO_4 \cdot 7H_2O$

Practice

- $CaCO_3$
- $Sr(NO_3)_2 \cdot 4H_2O$
- $Ca(OH)_2$
- H_2S
- $NaNO_3$
- HBrO
- NH_3
- P_4S_{10}
- LiF
- $PbCO_3$
- Hg_2Cl_2
- H_2O_2
- $CuCrO_4$
- H_2SO_4
- $Na_2CO_3 \cdot 7H_2O$
- NaCl

Practice

- Carbon dioxide
- Chloric acid
- Rubidium hydroxide
- Lithium sulfite
- Lead (II) oxide
- Copper (II) chloride
- Calcium hydrogen phosphate
- Hydroiodic acid
- Copper (I) cyanide
- Tetraphosphorus decasulfide
- Titanium (IV) Chloride
- Ammonium sulfate
- Barium chloride dihydrate
- Hyponitrous acid