Nomenclature (Naming)

Ionic Compounds

Recall: Ionic compounds generally form between metals and non-metals (really it has to do with a large difference in electronegativity which we'll discuss later)

Ex. Sodium Chloride $NaCl$
Calcium Oxide CaO
Zinc Phosphide Zn_3P_2

Notice that all the names have 1) the metal first and 2) the non-metal changes it's ending to "ide"

Ionic Compounds with *multivalent metals*

Alkali metals (column 1), and alkali earth (column 2) metals have a known charge; meaning that their charge is always the same. There are some transition metals (column 3-12) that have multiple charges.

Ex. Copper Chloride → $CuCl$ or $CuCl_2$
Iron Bromide → $FeBr_2$ or $FeBr_3$

Both copper and iron have at least two possible charges; we call these "multivalent" because they can take on multiple different valences (outer electrons). Because there are multiple possibilities, we need a way to denote which copper or iron we're dealing with; we use Roman numerals (I, II, III, IV, V, VI, VII, VIII, IX, X)

Ex. $CuCl$ become copper (I) chloride
$CuCl_2$ becomes copper (II) chloride
$FeBr_3$ becomes iron (III) bromide

So to do this properly you need to know the charges on the metal AND the non-metal to figure out their proportions. **Try these**

Ex. Iron (III) sulphide Fe_2S_3
Sodium nitrate $NaNO_3$
Calcium phosphide Ca_3P_2
Molybdenum (II) oxide MoO

Covalent (or molecular) Compounds

Recall: covalent compounds form between two (or more) non-metals (this has to do with a small difference in electronegativity)

Ex. Carbon and chlorine CCl_4
Nitrogen and hydrogen NH_3

For both of the above (C + Cl) and (N + H) there are multiple possibilities of how they can combine nitrogen and hydrogen, for example

NH_3 - ammonia NH_4^+ - ammonium N_2H_4 - hydrazine

So we need a way to distinguish between 1 nitrogen and 3 hydrogens; 1 nitrogen and 4 hydrogens; and 2 nitrogens and 4 hydrogens. The answer is PREFIXES!

1 = mono	6 = hexa
2 = di	7 = hepta
3 = tri	8 = octa
4 = tetra	9 = nona
5 = penta	10 = deca

So NH_3 = nitrogen trihydride, N_2H_4 = dinitrogen tetrahydride etc...

Hydrates

Sometimes we tack on a water molecule... or 10. Just use the prefixes above to say how many waters you have, with the ending hydrate

Ex. $CuCl_2 \cdot 5H_2O$ copper(II)chloride pentahydrate
$NaHCO_3 \cdot 2H_2O$ sodium bicarbonate dihydrate

Bases and Acids

Bases are easy, acids are hard. We'll start with bases: bases are (at the chem 11 level) always a metal plus hydroxide. It's just that easy

Ex. $NaOH$ sodium hydroxide
$Ca(OH)_2$ calcium hydroxide
$Al(OH)_3$ aluminum hydroxide
etc...

Acids naming

Inorganic acids always start with H, and there are 3 types when it comes to naming. Those ending in "ate", "ite", and "ide".

"ate" becomes "ic"
"ite" becomes "ous"
"ide" becomes "hydro - - - ic"

Ex.	HNO_3	uses	nitr**ate**	so	nitr**ic** acid
	$HClO_2$	uses	chlor**ite**	so	chlor**ous** acid
	HCl	uses	chlor**ide**	so	**hydro**chlor**ic** acid
	$HClO_4$	uses	perchlor**ate**	so	perchlor**ic**

Sulphur and Phosphorus containing compounds add the ending "ur" or "or" before then new ending

Ex.	H_2SO_3	sulph**ur**ous acid
	H_3PO_4	phosph**or**ic

Organic Acids

Organic Acids always have a "- COOH" part associated with them, and the H in COOH is the acidic H. So sometimes you might see COO^- part for the ion associated:

Ex. Acetic acid / Acetate

CH_3COO^- – Acetate (or Ethanoate)
CH_3COOH – Acetic Acid (or Ethanoic Acid)

$CH_3CH_2CH_2COO$ – Propanoate
$CH_3CH_2CH_2COOH$ – Propanoic Acid