

MOLECULAR COMPOUNDS

- There are several kinds of molecular compound. We will learn to name two simple but important classes

① BINARY MOLECULAR COMPOUNDS

- molecular compounds containing only two elements

② ACIDS

- molecular compounds that dissolve in water to release H^+ ions
- corrosive to metals (react with many to produce hydrogen gas)
- contact hazard: can cause chemical burns to eyes and skin
- sour taste
- turn litmus indicator RED
- two kinds of acids:

① BINARY ACIDS

- contain hydrogen and one other element

② OXYACIDS

- contain hydrogen, OXYGEN, and another element

BINARY MOLECULAR COMPOUNDS

- Named based on the elements they contain, plus prefixes to indicate the number of atoms of each element in each molecule

① FIRST ELEMENT

- Add a GREEK PREFIX to the name of the element.
- Omit the "MONO-" (1) prefix if there is only one atom of the first element

② SECOND ELEMENT

- Add a GREEK PREFIX to the STEM NAME of the element
- Add the suffix "-ide" (as if you were naming an anion)
- DO NOT omit the "mono-" prefix if there is only one atom of the second element

↙ (The prefixes are also on p135 in the textbook!)

MEMORIZE THE GREEK PREFIXES. SEE COURSE WEB SITE FOR A LIST!

BINARY MOLECULAR COMPOUNDS

Examples:



boron trifluoride



dichlorine heptaoxide

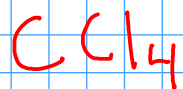


carbon monoxide

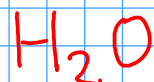


carbon dioxide

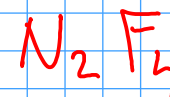
carbon tetrachloride



dihydrogen monoxide



dinitrogen tetrafluoride



MgCl_2 : This compound is MAGNESIUM CHLORIDE, not "magnesium dichloride". Why?
It's an ionic compound, and is named by that set of rules!

↑
Magnesium is a metal. Metal/nonmetal compounds are ionic, not molecular.

ACIDS

① BINARY ACIDS

- named after the element (other than hydrogen) they contain
- common binary acids include a Group VIIA element
- named: "Hydro-" + STEM NAME OF ELEMENT + "-ic acid"

Four
common
binary
acids

HF : hydrofluoric acid ✖ dissolves glass!

HCl : hydrochloric acid ✖ most common binary acid!

HBr : hydrobromic acid

HI : hydroiodic acid

ACIDS

② OXYACIDS

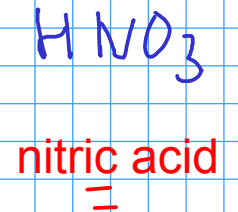
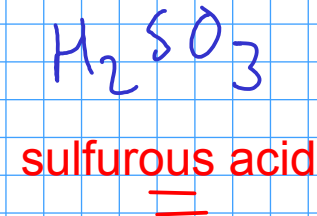
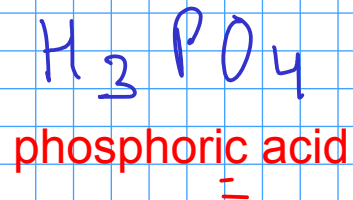
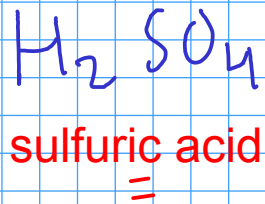
- Easy to think about as HYDROGEN IONS combined with POLYATOMIC IONS

- These acids are not true ionic compounds, but they interact with water to PRODUCE ions!

- named based on the polyatomic ion they contain, with an ending change:

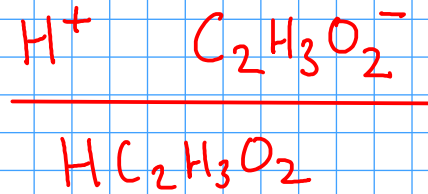
① - ions ending in -ATE form acids ending in -IC

② - ions ending in -ITE form acids ending in -OUS

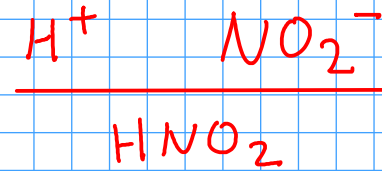


OXYACID EXAMPLES

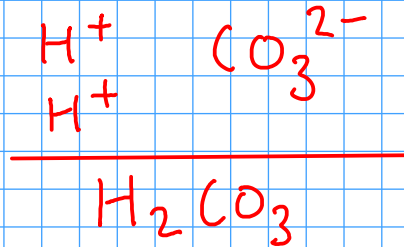
acetic acid



nitrous acid



carbonic acid



SUMMING UP CHEMICAL NOMENCLATURE

- You need to be able to tell, by looking at a name OR a formula, what kind of compound you are working with!

DON'T GET THE NAMING SYSTEMS MIXED UP! EACH KIND OF COMPOUND IS NAMED WITH ITS OWN SYSTEM!

FROM A CHEMICAL NAME

- If the name has a Roman numeral, the name of a metal, or "ammonium", the compound is likely IONIC

- If the name has a Greek prefix, the compound is BINARY MOLECULAR

- If the name contains the word "acid":

... and starts with "hydro-", then the compound is a BINARY ACID

... and does not start with "hydro-", the compound is an OXYACID

FROM A CHEMICAL FORMULA

- if the formula contains a metal or the NH_4^+ ion, it is likely IONIC
- If the formula starts with H and is not either water or hydrogen peroxide, the compound is likely an ACID. Which kind?
 - BINARY ACIDS contain only two elements
 - OXYACIDS contains oxygen
- If the formula contains only nonmetals (and is not an ammonium compound or an acid), the compound is likely MOLECULAR

Examples:

PCl_3 : BINARY MOLECULAR
Name: phosphorus trichloride

NH_4Cl : IONIC (ammonium ion)
Name: ammonium chloride

H_3PO_4 : OXYACID (hydrogen, phosphate)
Name: phosphoric acid