molecule ⇒ 2 or more atoms covalently bonded together
$H_2$, $H_2O$ H–Ö–H

→ individual units

ion → atom or group of atoms with a charge

cation (+) anions (−)
- monatomic or polyatomic
$N^{3-}$ $NO_3^-$ $NaNO_3$

* mercury(I) $Hg_2^{2+}$ $[Hg-Hg]^{2+}$

$Hg_2F_2$ mercury(I) fluoride

chemical formula → shows the composition of molecules (covalent) or formula unit (ionic)

empirical formulas → smallest whole # ratio
⇓
determined experimentally

"true" formula for most ionic compounds and some molecular compounds
$H_2O$ $NH_3$ $CH_4$

* watch out for mercury(I)

molecular formula → actual formula for a molecule
→ whole # multiple of the empirical formula

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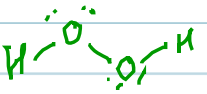
| | molecular | empirical |
|---|---|---|
| $H_2O$ | $H_2O$ | $H_2O$ |
| hydrogen peroxide | $H_2O_2$  | HO |
| glucose | $C_6H_{12}O_6$ | $CH_2O$ |

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allotropes → one of 2+ forms of an element in nature

$O_2$ $O_3$

carbon — graphite, diamond, fullerenes

phosphorus

white → explosive

red → more stable

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NOMENCLATURE "hubris"

I. BINARY MOLECULAR 2 nonmetals

→ use prefixes to represent subscripts (don't use "mono" on the first name)

$PCl_3$ phosphorus trichloride

$P_4S_3$ tetraphosphorus trisulfide

$Cl_2O_7$ dichlorine heptoxide

* NEVER USE PREFIXES W/ METALS *

common names: $CH_4$ methane $NH_3$ ammonia

$H_2S$ hydrogen sulfide $SiH_4$ silane $PH_3$ phosphine

$B_2H_6$ diborane $H_2O$ water

# IONIC NOMENCLATURE

A) BINARY metal + nonmetal "ide"

$K_2O$ potassium oxide $MgCl_2$ magnesium chloride

metal ion IA, IIA, IIIA, Ag, Zn $Mg^{2+}$ $MgCl_2$
→ name the metal

metal ion ⇒ transition metal, Pb, Sn

metal (name + numeral) + charge

$Fe^{2+}$ iron(II)
$Fe^{3+}$ iron(III)
$Cr^{6+}$ chromium(VI)

$MnCl_2$ manganese(II) chloride

$Mn^{2+}O^{2-}$ manganese(II) oxide

$MnO_2$ manganese(IV) oxide

$Hg_2Br_2$ mercury(I) bromide

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B) Polyatomic (ternary)

$NaNO_3$ sodium nitrate

$NaNO_2$ sodium nitrite