

Molecular Compounds

MOLECULAR THEORY - **nonmetal** atoms share electrons in a **covalent bond** to attain a maximum number of valence electrons (complete outer shell) rather than gaining electrons from metal atoms.

Ex. CO₂

Molecular elements- although the chemical formula of metals are frequently shown alone as a single atom (Na), nonmetals frequently form **diatomic molecules**.

Ex. H₂, N₂, O₂, F₂, Cl₂, Br₂, I₂

Also: O₃, P₄, S₈

Naming *Binary molecular compounds*

As outlined by IUPAC rules, some molecular compounds signify the number of atoms in the molecular formula by using the same prefixes as hydrates.

Ex. CS₂ carbon disulfide

see Table 9.4 p. 269

The prefix system is usually not used for hydrogen molecular compounds

Ex. water - H₂O

SiF_4 silicon tetrafluoride

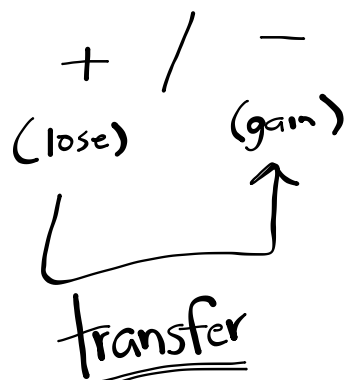
N_2O dinitrogen monoxide

Br HONClIF

P_4S_8

IONIC

metal / nonmetal



Ionic bond: + / -

MOLECULAR

nonmetal / nonmetal

Share



covalent bond

7e⁻
2e⁻

F

7e⁻
8e⁻
2e⁻

Cl

Bonding Capacity

H → 1

C → 4

O → 2

S

N

Cl

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium									

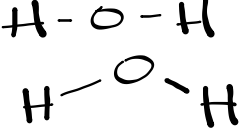
58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Molecular Models

What are the three-dimensional structures of the molecular substances: water (H_2O), hydrogen peroxide (H_2O_2), hydrogen sulfide (H_2S), methane (CH_4), methanol (CH_3OH), ethanol ($\text{C}_2\text{H}_5\text{OH}$), propane (C_3H_8), ammonia (NH_3), chlorine and sulfur (cyclooctasulfur)?



Copyright molymod

Name	Molecular Formula	Structural Diagram
Water	H_2O	
Chlorine	Cl_2	$Cl - Cl$
Sulfur	S_8	