Chemistry 20

Unit A: Matter and chemical bonding

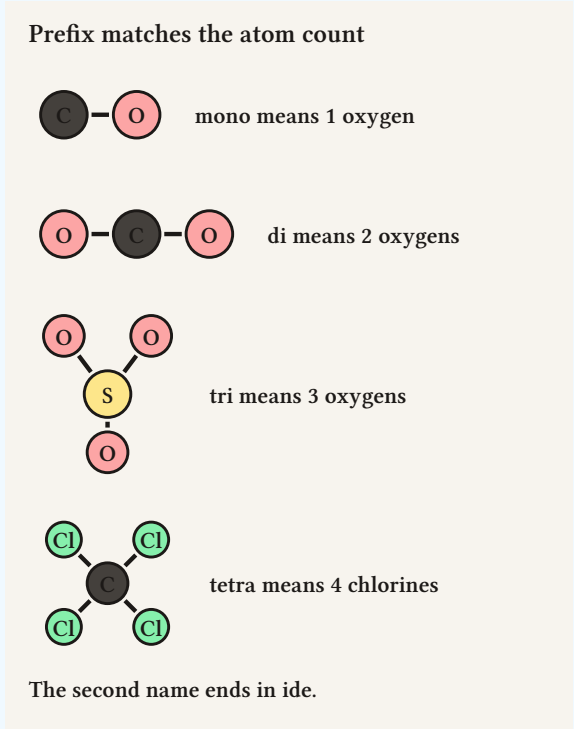
Molecular names and shared pairs

Two nitrogen formulas are two substances

- N_2O_4 names a molecule with two nitrogen atoms and four oxygen atoms.
- NO_2 names a different molecule, so dividing the first formula changes the substance.

Prefixes speak the atom count

- The prefixes mono, di, tri, and tetra mean one, two, three, and four atoms.
- Penta and hexa extend the same idea to five and six, and the second element ends in ide.



Key terms

molecular formula

A formula that counts the atoms of each element in one molecule, without dividing down to a smaller ratio. (N_2O_4)

covalent bond

A shared pair of electrons that holds two atoms together in a molecule. (one shared pair)

multiple bond

A double or triple bond, meaning two or three shared pairs between the same two atoms. (O_2 and N_2)

numerical prefix

A syllable such as mono, di, tri, tetra, penta, or hexa that states an atom count in a binary molecular name. (di means two)

The subscript is an atom count

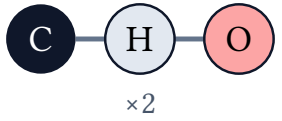
- Each subscript multiplies only the element it follows, unless parentheses say otherwise.
- Glucose, $C_6H_{12}O_6$, keeps its full formula when the molecule itself is meant; CH_2O is only the simplest ratio.

Subscript = atom count

$C_6H_{12}O_6$ glucose (full molecule)

Each molecule: 6 C, 12 H, 6 O

CH_2O (simplest ratio only)



1:2:1 ratio only; not full glucose

Oxygen shares two pairs

- A covalent bond is one shared pair.
- The bond in O_2 is a double bond, which is two shared pairs.

Nitrogen shares three pairs

- Each nitrogen atom starts with 5 valence electrons.
- The bond in N_2 is a triple bond, a multiple bond of three shared pairs.

Carbon dioxide

- The name carbon dioxide omits mono on carbon and uses di for two oxygen atoms.
- Each carbon-oxygen link in CO_2 is a double bond.