Chemical Bonding

A chemical bond is a force that holds atoms together in a compound. A compound is a substance composed of two or more elements chemically joined in fixed proportions.

We seperate compounds by their bond type, either ionic or covalent.

Ionic Bond: Is formed by the exchange of electrons. One atom gains electrons and the other loses electrons, creating an electrostatic attraction. Ionic bonds form when there is an electronegativity difference of greater than 1.7

Example: NaCl   sodium chloride
             MgI_2 magnesium iodide

Covalent Bond: Is formed by the sharing of electrons. This type of chemical bond happens between two non-metallic atoms with similar electronegativities. In general it forms when there is an electronegativity difference of equal to or less than 1.7

Example: CO_2 carbon dioxide
             CO carbon monoxide

Both require seperate naming rules.

Naming Binary Compounds

A binary compound is a compound composed of only two elements. The IUPAC (International Union of Pure and Applied Chemistry) states that all binary compounds end with the suffix -ide.

1) Molecular Binary Compounds

A series of prefixes is used when naming binary compounds. The prefixes indicate the number of atoms present.

Number of Atoms Present	Prefix Used
1	mono-
2	di-
3	tri-
4	tetra-
5	penta-
6	hexa-
7	hepta-
8	octa-
9	nona-
10	deca-

Examples

CO_2

CO

CCl_4

P_2H_4
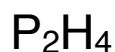
Note: The prefix 'mono' is only used to indicate the number of atoms of the second element in the chemical formula.

Molecular binary compounds are written by writing the symbol of the element followed directly by a subscript indicating the number of atoms. Subscripts are not reduced.

Examples

carbon disulfide

diphosphorus pentasulfide

tetraphosphorus decoxide

2) Ionic Binary Compounds

Ionic compounds are always written by listing the positive ion first. Subscripts are use to write the number of atoms present. To determine the number of atoms present of each and ensure charge balance, the charge of each atom is 'crossed over.'

Examples

barium chloride

sodium sulfide

potassium carbide

magneisium oxide

Note: the chemical formulas are to be reduced whenever possible.

A peroxide is a binary compound that conains one more oxygen then the most common oxide of that element

Examples

sodium oxide   sodium peroxide

potassium oxide   potassium peroxide

Many metallic elements have more than one possible oxidation state. When writing the chemical name of the compound containing these metallic elememts, the oxidation state of the metallic element is listed using a Roman numeral

Example:

copper (II) bromide

copper (I) bromide

iron (III) sulfide

mercury (II) oxide

When naming ionic compounds, the metallic element is listed first. No prefixes are used and an -ide ending is added.

Examples

NaBr

ZnO

AlF_3

If a binary compound contains a metallic element with more then one oxidation state the charge must be included in Roman numerals.

HgS

Compounds Containing Hydrogen

Hydrogen only contains one valence electron, so hydrogen compounds are named differently. If hydrogen appears first, prefixes are not used.

HCl

H_2S

HBr

Hydrogen can also form anions with metals

LiH

NaH

AlH_3

SCH 3U
J. Kropac

Classical Naming System

In the classical naming system, elements having two oxidation states were differentiated using 'ic' to indicate the higher oxidation state and 'ous' to indicate the lower oxidation state.

Examples

cupric chloride

cuprous chloride