SNC1D CHEMISTRY

ATOMS, ELEMENTS, & COMPOUNDS

- Chemical Names & Formulas (P.218-227)

Chemical Names

Like many substances, ionic and molecular compounds have both chemical names and common names. To name an ionic compound such as sodium chloride, write the name of the metal first: sodium. Then write the name of the non-metal and change its ending to "ide": chloride.

NOTE!

*This is just **one** rule for naming ionic compounds. Other ionic compounds have different rules for naming.*

Chemical Names

PRACTICE

1. What are the chemical names of the following compounds?
   - (a) $CaCl_2$ — *used to melt ice* — calcium chloride
   - (b) CaO — *used in plaster* — calcium oxide
   - (c) CuCl — *used to make red glass* — copper chloride
   - (d) KI — *added to "iodized" table salt* — potassium iodide
   - (e) AgCl — *used in photography* — silver chloride

Chemical Names

To name a molecular compound prefixes like mono, di, tri, ... are used to represent the number of each atom present in the molecule. For example, when carbon and oxygen combine you get the molecular compound: carbon dioxide (CO_2).

NOTE!

You will learn more about naming both ionic and molecular compounds in Grade 10.

Chemical Names

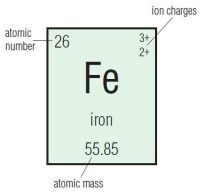
PRACTICE

2. What are the chemical names of the following compounds?

(a) CO_2	*dry ice*	carbon dioxide
(b) CH_4	*natural gas (methane)*	carbon tetrahydride
(c) NH_3	*ammonia*	nitrogen trihydride
(d) CO	*a silent killer*	carbon monoxide
(e) H_2O	*water*	dihydrogen monoxide

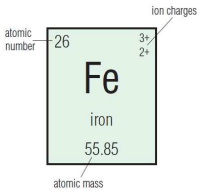
Chemical Formulas

Chemical formulas are used to represent compounds, but how do we know the proportions of each element in the compound? After performing many experiments, scientists discovered patterns in the ability of different elements to combine to form compounds. This ability is called the ***combining capacity*** *and is similar to the number of connections or bonds that an atom can make.*



Chemical Formulas

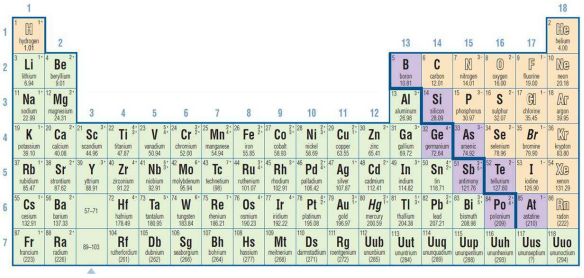
The combining capacity is also equal to the element's ***ion charge*** *which is indicated in the top right corner of the element's square on the periodic table. Most elements have only one combining capacity. However, some elements, such as iron, nickel, and copper to name a few, have more than one combining capacity.*



NOTE!

You will learn more about writing chemical formulas both ionic and molecular compounds in Grade 10.

Chemical Formulas

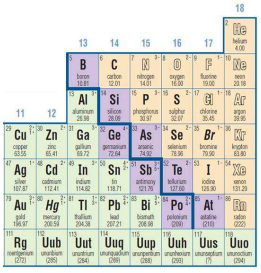


Chemical Formulas

PRACTICE

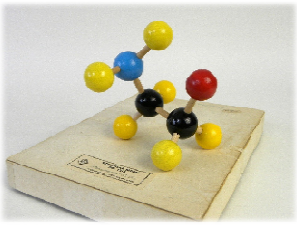
3. The elements in group 18 do not have an ion charge. Why?

they are the noble gases – they are stable and non-reactive



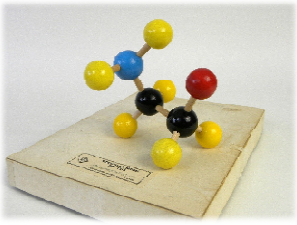
Building Molecular Models

Chemical formulas indicate how many atoms of each element there are in a molecule, but they do not convey any sense of the 3D nature of molecules. As such, chemists use models to gain information about the shape of a molecule. The shape of the molecule is a good predictor of its properties.



Building Molecular Models

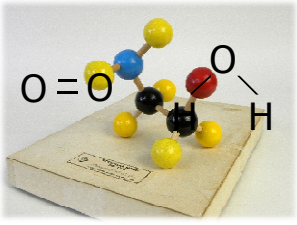
*In these models, the atoms are held together by connections called **bonds**. The connections represent the electrons that "glue" or bond the atoms together.*



Building Molecular Models

NOTE!

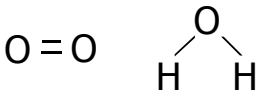
*The molecules can also be represented by drawings on paper called **structural diagrams**. In these diagrams, each atom is represented by its chemical symbol and each bond is represented by a straight line drawn between the symbols.*



Building Molecular Models

STRUCTURAL DIAGRAM

- pencil and paper drawing of a molecule



NOTE!

In some cases, more than one bond can exist between the same two atoms.

Building Molecular Models

As was discussed earlier, most elements form a fixed number of bonds – indicated by the ion charge – no more and no fewer. The table lists the number of bonds that each element will make.

Element	Symbol	Colour	# of Bonds
hydrogen	H	white	1
chlorine	Cl	green	1
oxygen	O	red	2
sulphur*	S	yellow	2
nitrogen*	N	orange	3
carbon	C	black	4

NOTE!

The coloured balls used in the model kits to represent sulphur and nitrogen actually have more holes than we need. The solution? Ignore the extra holes.

Activity: Building Molecular Models

The chemical formula shows the number and types of atoms in each molecule of a substance. But chemical formulas do not tell us how the atoms are arranged in a molecule. In this activity, you will use molecular model kits to build models of common molecules to see how they are put together.

NOTE!

There are two rules you must follow when building molecular models:

① each molecule is complete when all the balls are connected in such a way that all the holes are filled, and

② it is possible in some cases for more than one connection to exist between the same two atoms (i.e. a double bond or a triple bond).

Activity: Building Molecular Models

INSTRUCTIONS

A. Copy the table on the next page onto a blank page (neatness counts). Be sure to leave enough room in the table to include sketches!
B. Obtain a molecular model kit (you will be working in pairs).
C. For each molecule:
   (a) build the molecule
   (b) have the teacher check it
   (c) sketch a structural diagram of the molecule
   (d) indicate whether the molecule is an element (E) or a compound (C)
D. Submit your table when you are finished.

Activity: Building Molecular Models

Chemical Formula	Sketch	Common Name/Use	E/C?
H_2		hydrogen gas (fuel)	
Cl_2		chlorine gas (pool disinfectant)	
O_2		oxygen gas (breathing)	
N_2		nitrogen gas (cryogenics)	
HCl		hydrogen chloride (stomach acid)	
H_2O		water (drinking)	
CH_4		methane (natural gas)	
NH_3		ammonia (cleaner)	
H_2O_2		hydrogen peroxide (disinfectant)	
CO_2		carbon dioxide (puts out fire)	
C_2H_2		acetylene (fuel)	
C_2H_4		?? (used to make plastic)	
C_3H_8		propane (fuel)	