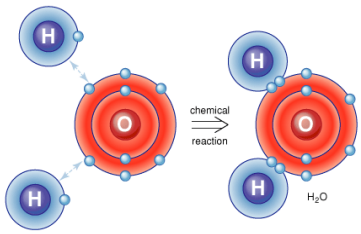
Grade 9 Science



Unit One: Atoms, Elements and Compounds

Chapter Three

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Chemical Compounds

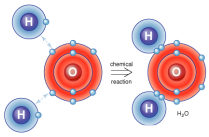
Chemical Compounds: pure substances made of two or more kinds of elements that have chemically combined

When elements combine, atoms form BONDS with one another

There are two types of bonds:

1) Ionic Bonds
2) Covalent (Molecular) Bonds

Chemical Formula: compounds are represented by a combination of chemical symbols; indicates the proportion in which the elements are present



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Ionic Bonds

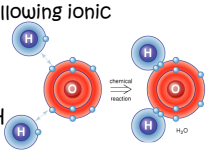
Ionic Bonds: occur when oppositely charged ions attract together

i.e. when a metal and one or more non-metals come together

This happens because metals ions are ALWAYS positively charged (lose electrons), and non-metals are ALWAYS negatively charged (gain electrons)

You will be responsible for knowing the following ionic compounds:

1) sodium chloride (table salt): NaCl
2) calcium carbonate (chalk): $CaCO_3$
3) sodium hydroxide (strong base): NaOH



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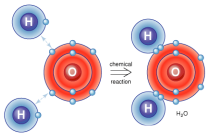
Naming Ionic Compounds

When naming simple ionic compounds, the metal name remains the same, and the non-metal name is changed to end in -ide

i.e. Calcium and carbon combine to form calcium carbide.. we dropped the "on" and replaced it with "ide"

The name of the metal ALWAYS goes first



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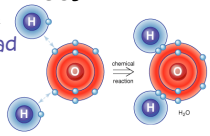
Covalent Bonds

Covalent bonds are different from ionic bonds. In ionic bonds, atoms gain or lose electrons. In covalent bonds, atoms share electrons to form a molecule.

Molecules: made from two non-metal atoms coming together

You will be responsible for knowing the following covalent molecules:

1) sucrose (table sugar): $C_{12}H_{22}O_{11}$
2) carbon dioxide (what you breathe out): CO_2
3) methane (what cows fart out): CH_4
4) water (what you should drink instead of Gatorade): H_2O



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Naming Covalent Compounds

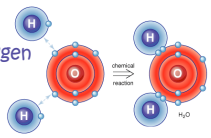
Naming covalent compounds is more difficult!

Step 1: Name the first atom
Step 2: Name the second atom by ending the element name with -ide
Step 3: Add prefixes to the atom names to indicated the number of each atom in the compound
Step 4: Write the name of the compound

Table 3.4 Prefixes Used in Naming Covalent Compounds

Number of atoms	Prefix
1	mono (used only for the second atom)
2	di
3	tri
4	tetra
5	penta
6	hexa
7	hepta
8	octa
9	nona
10	deca

i.e. NO_3 - N is nitrogen, O is oxygen. We change oxygen to "oxide." There are 3 oxygen atoms: trioxide. So the name is Nitrogen Trioxide



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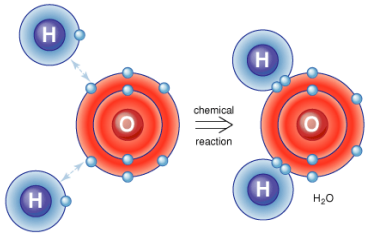

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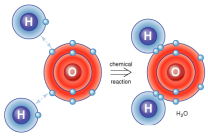
Physical Changes

A physical change happens when the appearance of a substance may have changes but the bonds holding the atoms together in molecules and ions have not been broken and no new bonds have been formed

Physical Changes Include:
- Change of state (melting, evaporation, condensation, freezing)
- Dissolving
- Cutting

Physical changes tend to be easy to reverse



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Chemical Changes

Chemical changes produce new substances with new properties; may or may not be noticeable

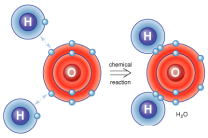
New bonds are formed while others are broken

Chemical Changes Include:
- Corrosion
- Fruit Ripening
- Combustion

Chemical equations can be written for all chemical changes
For example: the composition of water

$2H_2 + O_2 \longrightarrow 2H_2O$

reactants products



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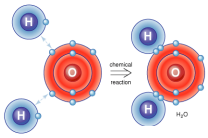
Chemical Changes Continued

In a chemical reaction, the mass of the reactants = the mass of the products

The elements are conserved but not the compounds

Evidence of a Chemical Change:
1) Color change
2) Heat, light, sound produced or consumed
3) Gas bubbles released
4) A precipitate is formed
5) Difficult to reverse



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Questions
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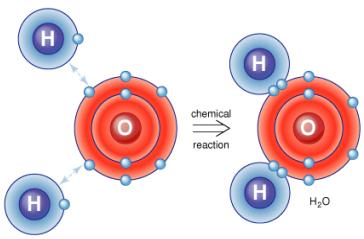

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