

Chemistry Review- Packet 11, Page 1

- Atom- smallest particle of an element with the same properties as that element
 - In size the entire atom has been thought to be approximately four-billionths of an inch, meaning that approximately 250,000,000 atoms of this size must be put into line to span 1 inch.
- Element- matter made of one type of atom; cannot be broken down by chemical or physical means




Compound vs. Molecule

- **Compound**- matter made of two or more different elements; chemically bonded; cannot be separated by physical means; has properties different from elements that make it up
 - **6.2-** THE STUDENT WILL EXPLAIN THAT COMPOUNDS FORM WHEN TWO OR MORE DIFFERENT KINDS OF ATOMS BOND.
- **Molecule**- matter made of two or more elements (same or different); smallest particle of a substance with the same properties as that substance
 - **Heteroatomic molecule**- must have more than one type of atom, such as water (H_2O) and carbon dioxide (CO_2).
 - **Homoatomic molecule**- a molecule consisting of atoms of the same element; i.e. diatomic



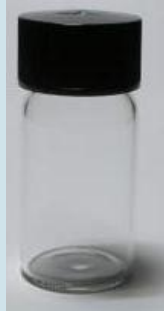

Types of Molecules

- **Diatomic Molecule**- simplest molecule; two of the same atoms bonded together
 - H₂ O₂ F₂ Br₂ I₂ N₂ Cl₂
 - HOFBrINCl twins
 - **I Have No Bright Or Clever Friends**
 - **Hydrogen**; the rest form a 7 on the periodic table: **N, O, F** across, then going down **Cl, Br, I**.
- **Polyatomic Molecule**- Molecules containing more than two atoms are termed polyatomic molecules, *e.g.*, carbon dioxide (CO₂) and water (H₂O).
 - **6.4- THE STUDENT WILL COMPARE AND CONTRAST MOLECULES AND COMPOUNDS.**



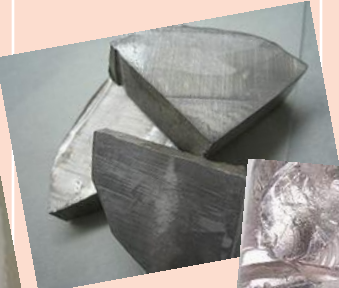




6.5- THE STUDENT WILL COMPARE THE PROPERTIES OF COMPOUNDS WITH THE PROPERTIES OF THEIR ELEMENTS.

	Compound Name and Formula	Contains these Elements	
	<p>Table Salt Sodium chloride NaCl</p>	Sodium, Na	Chlorine, Cl
<p>Properties of Each Element or Compound</p>	<p>white, cubic crystals, "salty" taste</p>	<p>soft, malleable, metal, silver color, explodes in water</p>	<p>poisonous, highly irritating, gas, greenish-yellow color</p>
<p>Picture</p>			

6.5- THE STUDENT WILL COMPARE THE PROPERTIES OF COMPOUNDS WITH THE PROPERTIES OF THEIR ELEMENTS.

	Compound Name and Formula	Contains these Elements		
	Table Sugar Sucrose $C_{12}H_{22}O_{11}$	Carbon, C	Hydrogen, H	Oxygen, O
Properties of Each Element or Compound	White color, Crystals, Sweet taste	Crystal form: graphite, diamonds; Non-crystal form: coal	Gas, Colorless, Highly flammable	Gas, Colorless, Odorless, Tasteless
Picture				

6.5- THE STUDENT WILL COMPARE THE PROPERTIES OF COMPOUNDS WITH THE PROPERTIES OF THEIR ELEMENTS.

	Compound Name and Formula	Contains these Elements			
	Baking Soda Sodium bicarbonate NaHCO_3	Sodium, Na	Hydrogen, H	Carbon, C	Oxygen, O
Properties of Each Element or Compound	white, powder, crystals/lumps	soft, malleable, metal, silver color, explodes in water	Gas, Colorless, Highly flammable	Crystal form: graphite, diamonds; Non-crystal form: coal	Gas, Colorless, Odorless, Tasteless
Picture	 	 			

Physical Properties and Physical Changes

Physical Property

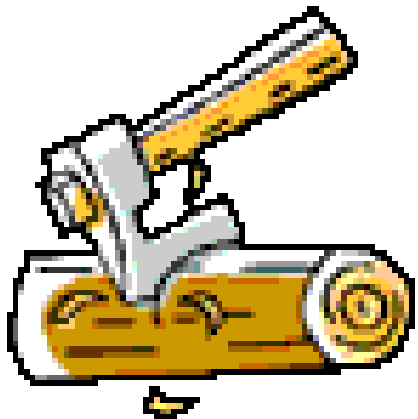
- observed with the senses (color, shape, odor, state/phase of matter)
- phase changes (melting point, boiling point, freezing point)

Physical Change

- Physical changes are about energy and states of matter
 - You can cause physical changes with forces like motion, temperature, and pressure.
- MATTER:
 - Alters the form or appearance of a material
 - Does not make the material into a new substance; the matter is the same before and after the change
 - Original matter can be recovered; change can be “undone”

Physical Changes

- PARTICLES:
 - The molecules of the substance are rearranged, NOT atoms
- EXAMPLES:
 - chopping wood, bending copper wire into new shapes, painting a car, ice melting into water



Chemical Properties and Chemical Changes

Chemical Property

- Observed during a chemical reaction; the way it reacts to another substance
- Based on the structure of the atoms or molecules

Chemical Change

- any change that results in the formation of new substances
- MATTER:
 - The matter is different; the original matter is no longer present and cannot be recovered; the change cannot be “undone”
 - The substances present at the beginning of the change are not present at the end

PARTICLES

Chemical Changes

- Bonds between atoms in molecules are broken, atoms are rearranged, and new bonds are made
- Forms a new substance with molecules with a different structure
- contains the same elements, but rearranged in new combinations

EXAMPLES: Rusting of iron (oxidation), burning of gasoline in an engine (flammability)



Flammable vs. Combustible

- The distinction is determined by how easily they ignite
- **Flash point**- the lowest temperature at which it can produce a flame when a source of ignition is present.
- **Flammable**- material that can easily catch fire under normal circumstances and with the help of minimal ignition source. Just a spark is sufficient enough
 - Flash point: below 100°F
 - Example: gasoline, propane
- **Combustible**- material that will burn; but more vigorous conditions are required for an ideal combustible material to burn; A simple spark is definitely not enough.
 - Flash point: above 100°F
 - Example: paper, wood