

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Chemical Change, Symbols, and Separation of Mixtures

**Physical change:** A change in the **state of matter**. It does **not result in a new type of substance**. For example, melting wax or ice. Most of the physical changes are **reversible** (you can change them back easily).

**Physical properties** are associated with physical state and changes: texture, density, hardness, viscosity, crystalline form, boiling point, freezing point, and vapor pressure.

**Chemical Change:** Chemical change is associated with **change that results in a new substance with different properties**. A chemical reaction is normally not easily reversed. For example, burning a piece of magnesium in oxygen produces magnesium oxide - a new substance.

**Chemical properties** are associated with changes of substances making up the matter. E.g. Corrosiveness refers to the readiness of certain metals to react with other elements such as oxygen and chlorine. Flammability refers to readiness of organic matter to react with oxygen to produce carbon dioxide and water. It also indicates the reactivity of certain substances towards another.

<b>Matter</b> - Anything with mass and volume.			
<b>Mixtures</b>		<b>Pure Substances</b>	
Matter with variable composition		Matter with constant composition and properties	
<b>Heterogeneous Mixtures</b> Mixtures that are made up of more than one phase	<b>Homogeneous Mixtures</b> Mixtures that are made up of only one phase (Also called solutions)	<b>Elements/allotropes</b> Substance made up of only one type of atom	<b>Compound</b> Two or more elements that are chemically combined
<b>Examples</b> - sand, soil, chicken soup, pizza, chocolate chip cookies.	<b>Examples</b> - salt water, pure air, metal alloys, seltzer water.	<b>Examples</b> - gold, silver, carbon, oxygen and hydrogen	<b>Examples</b> - water, carbon dioxide, sodium bicarbonate, carbon monoxide

### How are elements given symbols?

Chemical symbols uses letter in the element name can be one or two letters. The first letter is always a capital case and the second letter is always a small case.

Na = sodium

K = potassium

Fe = iron

Cu = copper

Ag = silver

Pb = lead

Au = gold

Hg = mercury

**Separating Mixtures:** Mixtures are could be separated by following methods using the differences in the physical properties of the substances making up the mixture.

<b>Physical Separation</b>	<b>Temperature driven</b>	<b>Extraction based on solubility</b>
Buoyancy, Flotation based on Densities (plastic/water)	Distillation and Evaporation (alcohol/water)	Paper, Liquid, Gas Chromatography (solutes/solvent)
Filtration/centrifugation (mud/water)	Zone Refining (Melting) (silicon and germanium)	Crystallization (sugar/water)
Magnetic Separation (iron dust/sand)	Sublimation (solid → gas) (iodine crystals and sand)	

1) What is a physical change? Describe it generally and give several examples.	2) What is a chemical change? Describe it generally and give an example.
3) List three physical properties: Describe and give an example. a) b) c)	4) List three chemical properties: Describe and give an example. a) b) c)
5) What is a mixture? and give an example.	6) What is (describe and give an example): a) Homogenous mixture?  b) Heterogeneous mixture?
7) What is a pure substance? Describe and give two examples.	8) What is an element? Describe and give an example.
9) What is a chemical compound? Describe and give an example.	10) How are the compounds given formulas? Give three examples
11) Identify following as physical and chemical change: Frying an Egg Vaporization of Dry ice Boiling water Burning Gasoline Breaking Glass Souring Milk Compression of a spring	12) Classify as heterogeneous/homogenous mixtures? Salt Water Chocolate Chip Cookie Handful of Soil Vegetable Garden Ice Cream Sundae Steel Bronze
14) Describe methods that have been used to separate following mixtures of matter. a) salt/water  b) iron dust/sand  c) alcohol/water	d) mud/water  e) leaf extract/chlorophyll (separate the colors in a leaf)  f) Helium and hydrogen gas