

I ELEMENTS:A. Elements, the Simplest Substances:

1. An element is a pure substance.
2. It cannot be broken into simpler substances by physical or chemical means.
3. Each element contains only one type of particles.
4. These particles are called atoms.

B. Properties of Elements:

1. Each element has its own characteristic properties.
2. These properties do not depend on the amount of the element present.
3. Examples of characteristic properties:

Melting point

flammable

Boiling point

react with acid or water

density

produce a color in a flame

C. Classifying Elements by Their Properties:

1. Elements are broken into categories by the properties they share.
2. There are three major categories of elements:

a. Metals...that are:

\* shiny

\* good conductors

\* malleable

\* ductile



b. Nonmetals....that are:

\*dull

\*bad conductors

\*brittle

\*not ductile



Sulfur



Bromine



Neon

c. Metalloids...

\* have properties of both metals & nonmetals

\* also called semiconductors

\* some are shiny or dull

\* somewhat malleable

and ductile



Silicon

Antimony

Boron

## II COMPOUNDS:

### A. Compounds: Made of Elements:

1. A compound is a substance composed of 2 or more elements that are chemically combined.
2. Elements must join in a specific ratio .
3.  $H_2O$  = water     $CO_2$  = carbon dioxide
4. The smallest part of a compound is called a molecule.

### C. Properties of Compounds:

1. Each compound has its own physical & chemical properties.
2. Properties of a compound are different from the properties of the elements in the compound.
3. For example: water is made of hydrogen & oxygen which as separate elements are in the gas form.



## D. Breaking Down Compounds:

1. Compounds can be broken down into their elements or into simpler compounds *ONLY* by chemical changes.
2. Adding energy, in the form of electricity can break down water into hydrogen & oxygen.
3. Adding energy, in the form of heat can break down mercury oxide into mercury & oxygen.



## E. Compounds in Your World:

1. Aluminum Oxide in nature provides us with aluminum.
2. Ammonia is used to make fertilizers. It is made by combining nitrogen and oxygen
4. Carbon dioxide is used by plants in the process of photosynthesis The plants can make carbohydrates (glucose) which are carbon compounds.



## III MIXTURES:

### A. Properties of Mixtures:

1. A mixture is a combination of 2 or more substances that are NOT chemically combined.
2. No chemical change happens when a mixture is made.
3. Each substance in the mixture keeps its identity.
4. Examples:



Pizza-cheese, pepperoni, anchovies

Saltwater- salt and water

Blood- red and white blood cells, plasma

5. You can separate mixtures by physical means.
6. How can you separate the following?



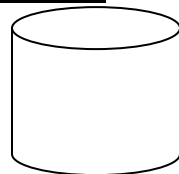
- a. Salt and water: evaporate the water.
- b. Iron & aluminum nails: use a magnet.
- c. Plasma & red blood cells: spin it (centrifuge).
- d. Peas & carrots: by hand.
- e. Sand & water: filter it.



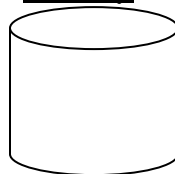
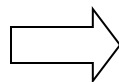
7. The parts of a mixture are NOT in a definite ratio.

## B. SOLUTION: One Type of Mixture:

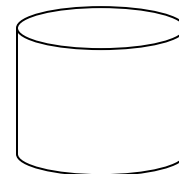
1. A solution appears to be a single substance.
2. Solutions have the same appearance throughout.
3. Dissolving: process by which the particles of a substance separate and spread out evenly throughout the mixture.



Before



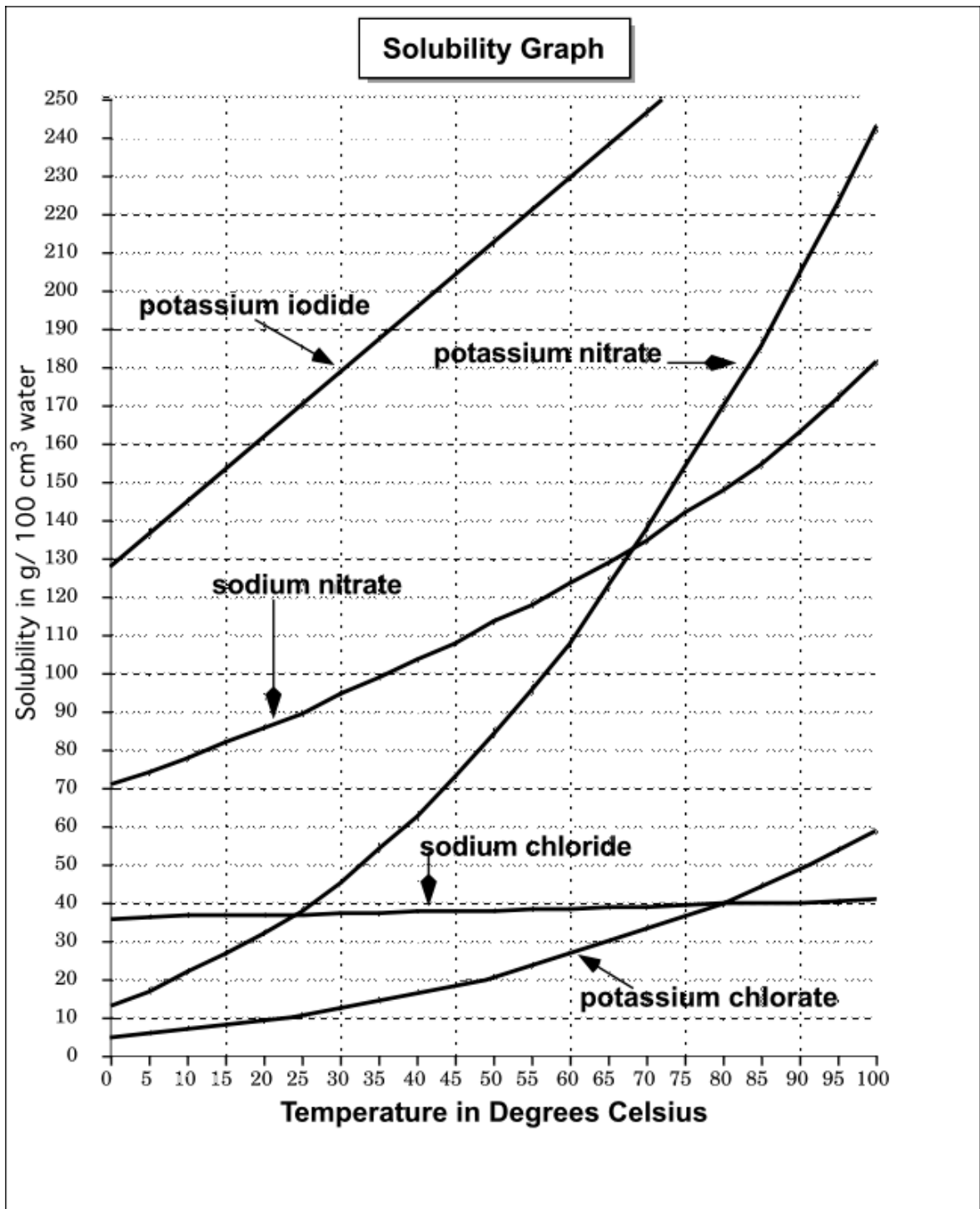
Solution Forming



Solution !

4. Solute: the substance that is dissolved.
5. Solvent: the substance that does the dissolving.
6. Examples: saltwater soda air
7. Soluble means: able to be dissolved
8. Insoluble means: can't be dissolved
9. Particles in a solution are so small that...
  - a. they do not settle out.
  - b. they don't scatter light, so solutions are transparent.

1. A concentrated solution has a lot of solute in a solvent.
2. A dilute solution has a small amount of solute in a solvent.
3. The **SOLUBILITY** of a solute is the ability of the solute to dissolve in a solvent at a certain temperature.
4. Solubility Graph: (The most common solvent is water.)



5. Solubility in liquids:

- a. Most solids are more soluble at higher temperatures.
- b. But gasses are less soluble at higher temperatures.
- c. Three ways to increase solubility:



\*Stirring -makes particles move faster

\*Heating it-makes particles move apart

\*Crush it-increases surface area.

6. A saturated solution has the most amount of solute dissolved in the solvent for that temperature. If more solute is added, it does NOT dissolve. It will sink to the bottom.
7. A supersaturated solution holds more solute than the solvent can hold for that temperature. It is made by slowly cooling a saturated solution.

D. SUSPENSION: Another Type of Mixture:

1. When 2 or more substances are mixed but NOT dissolved.
2. Particles are large enough so they will settle out.
3. Examples: snow globe      oil and vinegar
4. Particles block light, not transparent.

E. COLLOID: Another Type of Mixture:

1. When 2 or more substances are mixed but NOT dissolved.
2. Particles are too small so they will NOT settle out.
3. Examples: smoke      milk
4. Colloids are NOT transparent.

