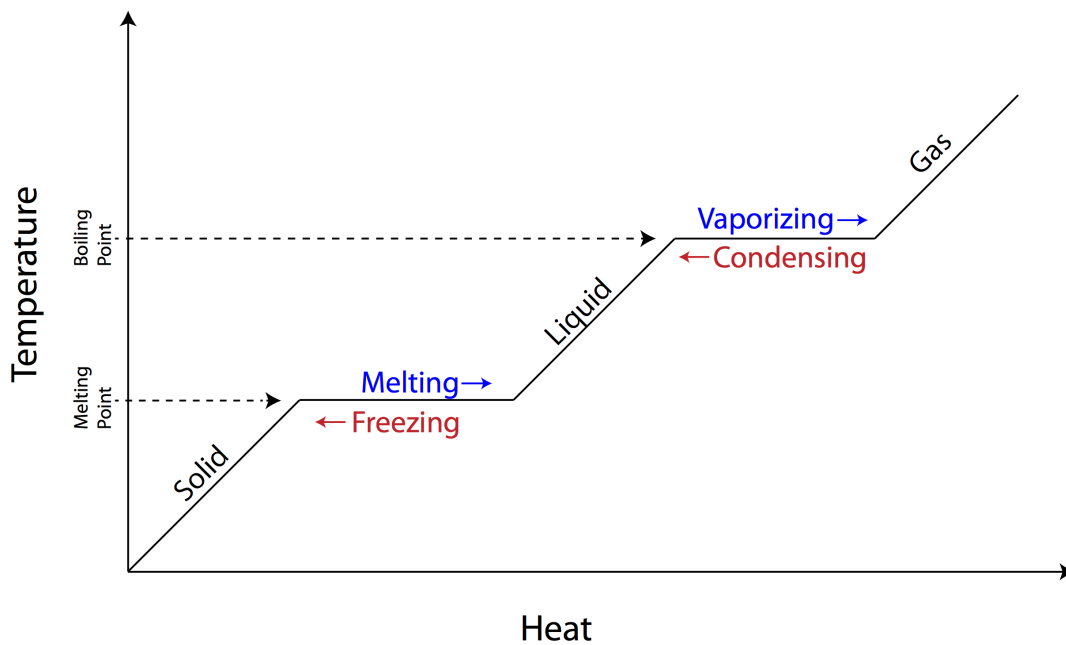
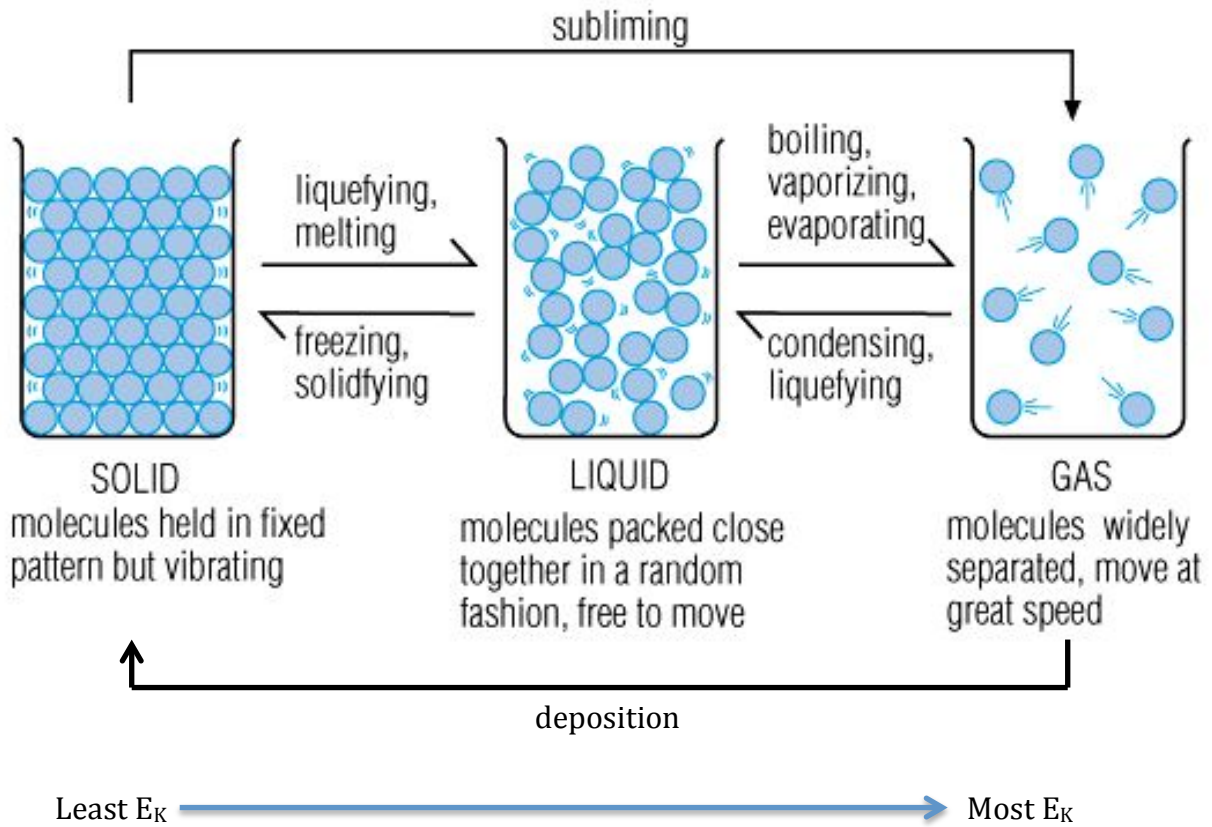


Changes of State



Pure Substances vs. Mixtures

Pure substance – a substance that is not mixed with other substances

Element – a substance that cannot be broken down further

Examples: Aluminum (Al) Barium (Ba)
Gold (Au) Carbon (C)
Hydrogen (H) Oxygen (O)
Nitrogen (N)

Elements are defined by the number of protons (atomic number) in their atoms.

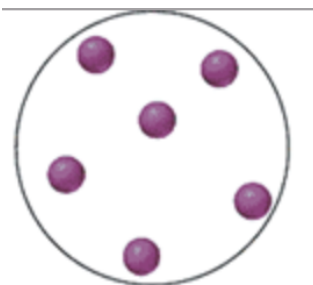
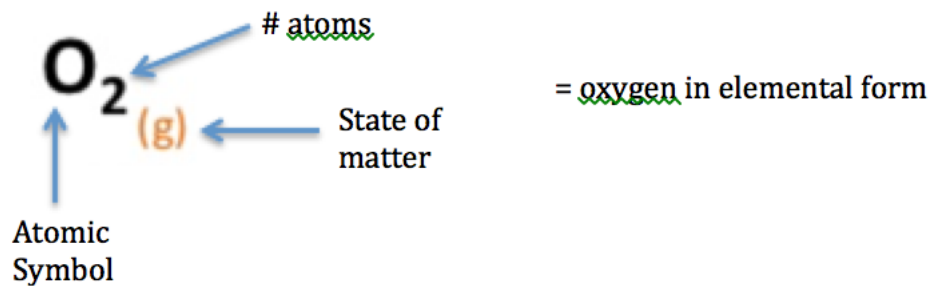
Atom – the smallest unit of an element

3 parts of an atom:

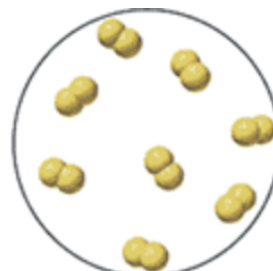
proton (positively charged particle in nucleus)

neutron (uncharged particle in nucleus)

electron (negatively charged particle outside of nucleus)



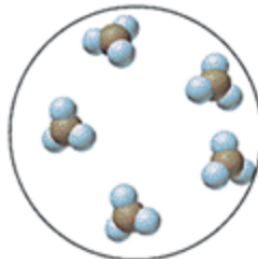
Helium



Oxygen

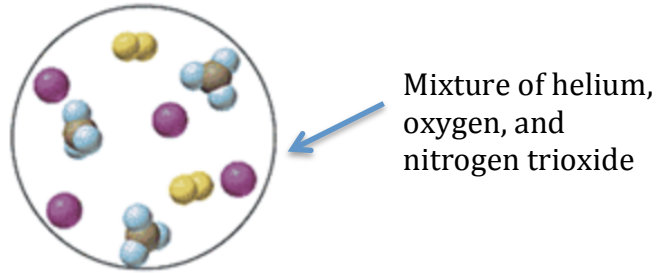
Compound – a substance made of two or more elements chemically bonded

Examples: water, carbon dioxide, sugar, nitrogen trioxide



Nitrogen trioxide

Mixture – a combination of 2 or more substances that are NOT chemically bonded



Mixtures can be separated into their individual parts.
Some methods used to separate parts of a mixture:

- Pick pieces out
- Boil/evaporate solvent
- Filter
- Magnet (if one part is magnetic)

Decanting
Precipitation

3 kinds of mixtures:

<u>Solutions</u>	<u>Colloids</u>	<u>Suspensions</u>
Very small particles	Medium particles	Very large particles (seen by eye)
Can't be filtered	Can't be filtered	Can be filtered
Homogeneous	Heterogeneous	Heterogeneous
Ex: Kool-Aid	Ex: Mayo	Ex: Salad Dressing

Solutions have two parts: solutes and solvents

Solute – the smaller portion of a mixture (dissolves in solvent)

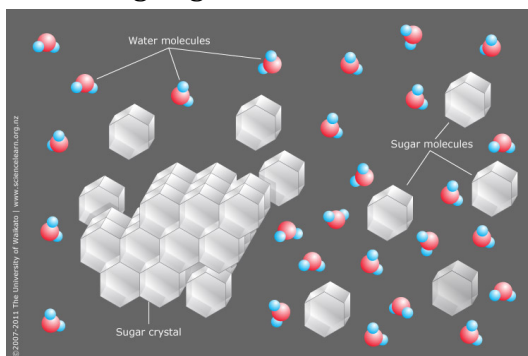
Solvent – the larger portion of a mixture (dissolves the solute)

<u>Example</u>	<u>Solute</u>	<u>Solvent</u>
Kool-Aid	Powder	Water
18K Gold	Silver	Gold

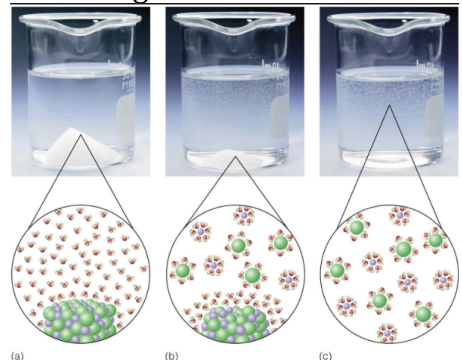
Water is the “universal” solvent because it dissolves so many things, but it does not dissolve everything.

If a solute will dissolve in a given solvent, it is **soluble** in that solvent.

Dissolving Sugar:



Dissolving Salt:



Properties that affect solubility and rate of solubility

- Temperature
- Agitation
- Surface Area
- Type of Solvent
- Pressure

If a solution has:

<u>Solute</u>	<u>Solvent</u>	<u>Concentration</u>
Little	Lot	Dilute
Lot	Little	Concentrated

Solutions may be made from a variety of combinations of states of matter:

Solute	Solvent	Solution
Gas	Gas	Air (oxygen and other gases in nitrogen)
Gas	Liquid	Soda water (carbon dioxide in water)
Liquid	Liquid	Antifreeze (ethylene glycol in water)
Solid	Liquid	Dental filling (silver in mercury)
Solid	Liquid	Ocean water (sodium chloride and other compounds in water)
Solid	Solid	Brass (zinc in copper)