Science 6 - Quarter 1 - Module 1

Describing Mixtures

Mixtures
- combinations of two or more substances
- can be homogeneous or heterogeneous

Homogeneous mixtures
- appear uniform all throughout because they have the same proportion

Heterogeneous mixtures
- combined substances are not evenly spread or mixed
- not uniform in proportion of solute to solvent
- the components of the mixture can still be recognized

Differentiating a Solute from a Solvent

Solution
- a mixture that is formed when one substance dissolves into another
- homogeneous
- consists of a solute and a solvent

Solute
- the substance that is being dissolved
- usually the one that is smaller in amount
- a solution can have one or more solutes

Solvent
- the substance that does the dissolving
- usually the one that is larger in amount
- water is the “universal solvent”

Soluble vs. insoluble
- Not all solutes can be dissolved in all solvents. If a certain solute can be dissolved in a certain solvent, it is described as soluble [in that solvent]; if a solute cannot be dissolved, it is described as insoluble [in that solvent].

Factors Affecting Solubility

Solubility
- the maximum amount of a solute that will dissolve in a given amount of solvent at a specific temperature
- affected by several factors:
    - nature of solute and solvent
    - temperature of solvent
    - manner of stirring
    - amount of solvent
    - size of the solute

Concentration
- how much solute is dissolved in a given amount of solvent

Dilute vs. concentrated
- dilute - a solution that has a small amount of solute
- concentrated - a solution that has a lot of solute

Solutions and Their Characteristics

Characteristics of a solution:
- It is a homogeneous or uniform mixture.
- It may be formed by any two substances that can be evenly mixed.
- It exists in any phase.
    - Note: Even if it is made of different phases, if the result exists in a single phase, it is a solution.
    - Example of a solid solution: steel (iron, carbon, etc.)
    - Example of a gaseous solution: air (nitrogen, oxygen, etc.)
- It does not scatter beams of light.
- It is stable over time.
- The solute and the solvent cannot be distinguished by the naked eye.
- The solute cannot be separated from the solvent by mechanical means (such as filtration).

Colloids and Their Characteristics

Colloid
- a type of mixture in which particles are dispersed uniformly throughout a gas, liquid or solid

- examples: blood, whipped cream, fog

Components:
- Dispersed phase
    - refers to the substance being dispersed
    - usually present in a relatively small amount
- Dispersion medium
    - the substance or solution throughout which particles are dispersed
    - usually the more abundant substance in a colloid
    - also called the continuous phase

To be classified as a colloid, the substance in the dispersed phase must be:
- larger than the size of a molecule, BUT
- smaller than can be seen with the naked eye.

Tyndall effect
- the effect of light scattering in a colloidal dispersion
- used to determine whether a mixture is a true solution or a colloid
    - if no light is shown/scattered, it is a true solution
    - if the light can be readily seen, it is a colloid, because it is the particles that scatter the light in all directions, making it easy to see

Types of colloids:
- sol - solid particles in a liquid
- aerosol - liquid/solid particles dispersed in a gas - ex. fog, mist, smoke
- foam - gas particles in a liquid - ex. soap suds, whipped cream
- emulsion - two liquids - ex. oil in water, milk

Suspensions and Their Characteristics

Suspension
- a kind of heterogeneous mixture where particles that are visible to the naked eye settle at the bottom when left undisturbed
- appears cloudy when mixed
- examples: soil and water, sand in the sea

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Separating Mixtures Through Filtering and Sieving

Filtering
- separates solid and liquid components using filter paper or cloth
- the liquid passes through, leaving the solid behind

Sieving
- separates two solid materials of different sizes using a sieve
- the smaller passes through, leaving the bigger behind

Separating Mixtures Through Evaporation

Evaporation
- process of separating mixtures which involves heating the solution until the solvent evaporates, leaving behind a solid residue
- example: salt solution

Separating Mixtures Through Decantation

Decantation
- technique used in separating substances of different densities
- the mixture must be left undisturbed (so that the less dense substance is at the top)
- the less dense substance can be removed by scooping or pouring it out
- example: oil in water, gasoline in water, fats floating in soup

Separating Mixtures Using Magnets

Magnets
- can be used to separate metallic from non-metallic objects
- metals most attracted to magnets: iron (and its alloys, incl. steel), nickel, cobalt
- no chemical reaction involved
- example: metals and nonmetals, iron filings from sawdust