

Mixtures and Solutions

MIXTURES

Mixtures are composed of two or more substances that are mixed together but can be separated from each other. Mixtures can be made from various combinations of solids, liquids, or gases. The substances in a mixture do not permanently change in the mixture, but they keep their separate properties. Some examples of mixtures are cereal with milk, trail mix, or salad.

One type of mixture is a **solution**. Solutions are mixtures that are composed of substances that mix so completely (by dissolving) that they cannot be distinguished as separate substances. They can, however, be separated back into the separate substances. One example of a solution is a mixture of a solid that dissolves completely in a liquid, for example salt or sugar in water.

1. What are mixtures? _____

2. What is an example of a mixture? _____
3. The substances in a mixture keep their _____ properties.
4. What are solutions? _____

5. What is an example of a solution? _____

SOLUTIONS AND CONCENTRATION

Solutions are types of mixtures and they are defined by the particles in them. The substance in a solution that is in the greatest amount is the **solvent**. It is usually the liquid. Water is a good solvent. It is sometimes called the “universal solvent” because so many things will dissolve in it. The substance in a solution that is in the least amount is the **solute**. It is usually the solid.

The relationship of the amount of solute to solvent determines the **concentration** of a solution. A solution is more concentrated when there is more solute compared to the amount of solvent. In order to make a solution more concentrated, more solute is added. To make a solution less concentrated, more solvent is added.

6. Which substance in a solution is usually the least amount? _____
7. Which substance in a solution is usually the greatest amount? _____
8. What substance is known as the “universal solvent?” _____ Why is it called this? _____

9. What does the word **concentration** mean in a solution? _____

10. How do you make a solution **more** concentrated? _____

PROCESSES TO SEPARATE A MIXTURE

Filtration is used to separate solid particles from a liquid. For example, pouring the mixture through a filter paper in a funnel will trap the solid particles and only allow the particles of the liquid to pass through. This method is used in water treatment plants as part of the process for separating dirt and other solid particles from water to produce clean drinking water.

Sifting is used to separate smaller solid particles from larger solid particles. For example, the mixture of different sized solid particles can be put into a container that has a screen material at the bottom with certain sized holes in it. When the mixture is shaken, the smaller particles go through the screen leaving the larger particles in the container. Cooks, for example, sift flour to get a small particle size for baking leaving larger particles of flour in the sifter above the screen. Sand and gravel companies, for example, separate rocks into different sized particles for road building and other construction projects using this method.

Magnetic attraction is used to separating magnetic material from a mixture of other substances. When a magnet is stirred through the mixture, it pulls out the magnetic material from the mixture. A cow magnet, for example, is given to a cow to swallow. It stays in the first stomach of the cow keeping magnetic materials like wire and other harmful materials that cows swallow from going into the rest of their digestive system.

Evaporation is used to separate a solid that has dissolved in a liquid solution. The solution is heated or left uncovered until all the liquid turns to a gas (evaporates) leaving the solid behind. Salt in salt water or ocean water, for example, is separated by heating the solution until all the water evaporates leaving the solid salt in the container.

Chromatography is used to separate and analyze the solutes in a solution. For example, a small amount (2-3 drops) of the solution is put on a piece of filter paper, which is put in a solvent. The substances in the solution that dissolve most easily travel the furthest; and substances that do not dissolve easily do not travel very far. The bands of color that are formed allow scientists to identify the substances in the solution by comparing them to the location of known substances forming bands of color on different filter papers.

Floatation is used to separate solids that float from the remaining liquid in a mixture. The solids are stirred and when they float to the top, they are skimmed off the surface of the liquid and put into a different container. This method is used, for example, in some water purification plants.

Use the bold words from the text above to match each description.

11. _____ is used to separate and analyze the solutes in a solution. Bands of color form on filter paper to show the different substances in the solution.
12. _____ is used to separate magnetic material from a mixture of other substances.
13. _____ is used to separate solid particles from larger particles in a mixture. Filter paper is used in a funnel to trap solids so that the liquids will pass through.
14. _____ is used to separate solids that float from the remaining solids and other items that remain in a liquid mixture. The solids float to the top on their own or when stirred, and are then skimmed off the surface of the liquid.
15. _____ is used to separate smaller solid particles from larger solid particles. A mixture of different sized solids is put into a container that has a screen material at the bottom with certain sized holed in it. The smaller particles go through the screen and the larger ones do not.
16. _____ is used to separate a solid that has dissolved in a liquid solution. The solution is heated or left uncovered until the liquid turns to gas and leaved the solid behind.