

Introduction

We have discussed the phases of matter and compared elements to compounds. We have not considered matter in all its forms, though. Matter occurs in many forms. In this unit, we will examine two conditions in which we find matter.

Reviewing Matter

It is time to review some of the things that we have learned about matter.

- Two or more elements combine chemically to form a compound.
- Compounds cannot be separated easily.
- A mixture of two or more substances does not combine chemically.
- Mixtures can be separated using physical means.

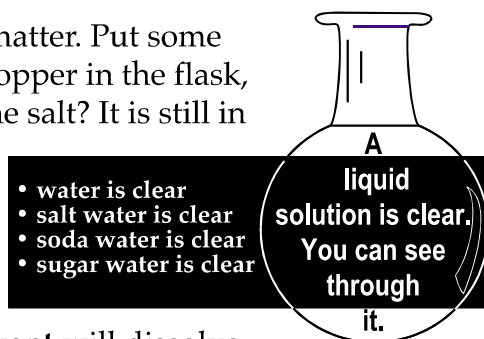
Solutions

Solutions are one of the ways we find matter. Put some water in a flask. Add some salt, put a stopper in the flask, and shake the flask. What happens to the salt? It is still in the flask, but you cannot see it. We say that the salt dissolved in the water.

This is an example of a **liquid solution**. A liquid solution is a mixture. It has one substance

dissolved into another substance. A **solvent** will dissolve another substance. Water will dissolve many different kinds of substances. Water is a solvent. Sometimes, it is called a **universal** solvent because it dissolves many different substances. Water will not dissolve everything, however, and does not dissolve substances like oil and grease.

The substance that dissolves is called a **solute**. Sugar will dissolve in water, and it is a solute. It forms a liquid solution with the water. All of the molecules of the sugar spread evenly throughout the solution. In a liquid solution, all of the substances mix evenly with each other. When a solution is evenly mixed and the same throughout, it is **homogeneous**. All solutions are homogeneous.

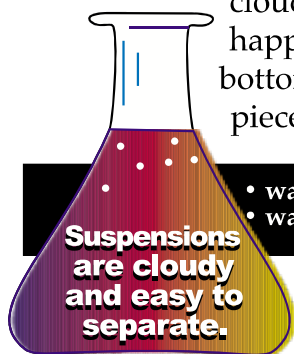


A liquid solution is clear. You can see through it. Salt water is clear. Soda water is a mixture of carbon dioxide and water. Soda water is clear also, and it is a liquid solution.

Suspensions

Some liquid mixtures are cloudy. Add some starch to a beaker of water. Stir it. The mixture is not clear. Instead, it is cloudy. The starch mixes with the water, but it does not make a liquid solution. Remember that a liquid solution is clear. This new, cloudy kind of mixture is called a **suspension**. A suspension happens when one substance does not dissolve or mix evenly throughout when mixed with a liquid. Suspensions are cloudy. Muddy water is a kind of suspension. Not all parts of a suspension are evenly mixed. **Heterogeneous** means that the parts are different and not mixed evenly. Suspensions are heterogeneous.

A suspension is easy to separate. Mix some clay with water. It will be cloudy. Let the clay and water stand overnight. What happens? You will notice that the clay will settle to the bottom. When a suspension is left standing, the solid pieces will fall out or settle out of the suspension.



- water & starch
- water & clay

There is another way a suspension can be separated. Suspensions can be **filtered**.

Pour the starch and water mixture through a **filter**. The starch will be caught in the filter, but the water will pass through.

Try to filter a beaker of salt water. What happens? You cannot trap the salt. The salt has mixed evenly with the water. It passes through the filter. The salt has dissolved in the water to the point that the pieces of salt are too small to be filtered. Salt water is a liquid solution. Liquid solutions cannot be separated with a filter.

The labels on some products say "Shake well before using." Why do you think this is necessary? The product is probably a suspension. The large parts of the suspension will settle, and you must shake it to remix the substances.

Summary

In this unit, we learned how to identify solutions and suspensions. We have also learned how suspensions can be separated.