

Mixtures, Solutions, and Suspensions

271

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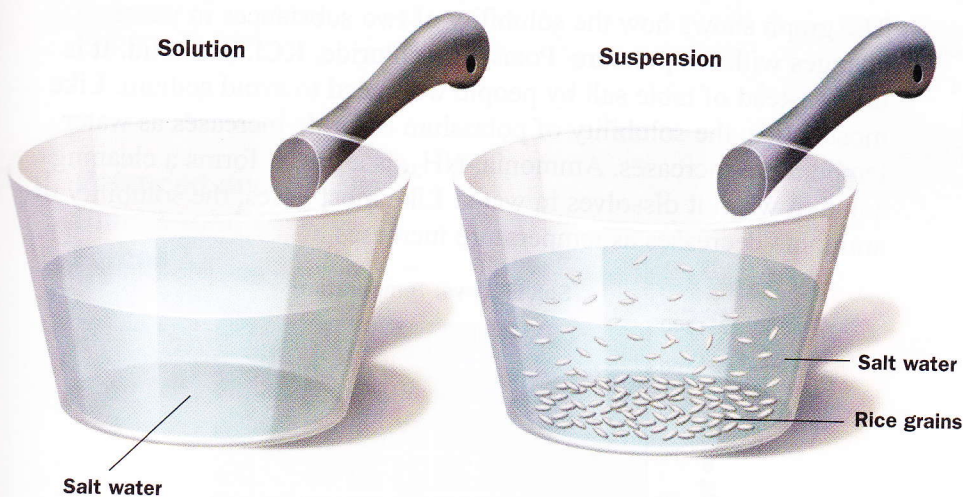
A compound is a substance made of two or more elements that are combined chemically. The ratio of the elements that form a particular compound is always the same. The properties of a compound are different from the properties of the elements from which it is made. A compound can be separated only by chemical means. Table salt (NaCl , or sodium chloride) is an example of a compound.

A **mixture** is a combination of two or more substances that have *not* combined chemically. A mixture can contain elements, compounds, or both, and in any amounts. Because the substances in a mixture are not combined chemically, they keep their unique properties and can be separated by physical means. Fruit salad is an example of a mixture.



Let's say you want to cook a pot of rice. First you add a pinch of salt to the water and stir. You notice the salt crystals seem to disappear. Where did they go? They dissolved and spread out evenly in the pot of water. This kind of mixture is called a solution. A **solution** is a mixture that looks like a single substance and has the same properties throughout.

Once the salted water begins to boil, you add the rice and stir. The rice grains swirl around in the pot of water. When you stop stirring, they settle to the bottom. This kind of mixture, in which the components are dispersed but large enough to see and to settle out, is called a **suspension**.



Parts of a Solution

Within a solution, one substance is dissolved in another substance. The substance that dissolves is called a **solute**. The substance into which a solute dissolves is called a **solvent**. In the example of salt water, the salt is the solute and the water is the solvent.

Solutions are not always in liquid form, however. Some gases and solids are also considered solutions. For example, the air you breathe contains oxygen dissolved in nitrogen. Bronze is a solution of the metals copper and tin.



Many substances dissolve in water. For this reason, water is considered a “universal” solvent.

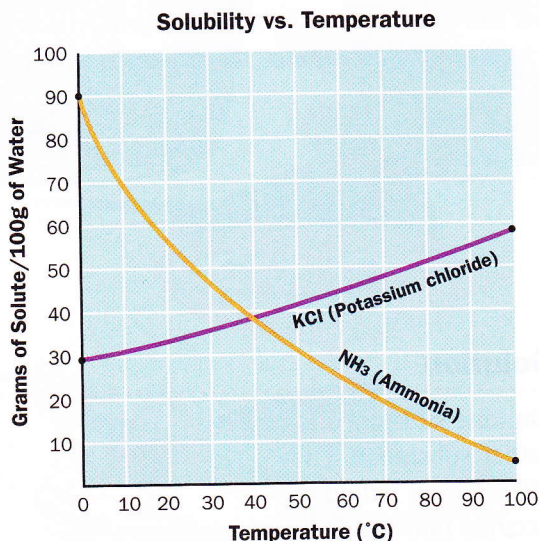
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Solution

Solubility and Temperature

Hot tea will dissolve more sugar than cold tea. But cold soda will dissolve more carbon dioxide gas than warm soda. Temperature has an effect on solubility. **Solubility** is the ability of a substance to dissolve in another substance.

The graph shows how the solubility of two substances in water changes with temperature. Potassium chloride, KCl, is a solid. It is used instead of table salt by people who need to avoid sodium. Like most solids, the solubility of potassium chloride increases as water temperature increases. Ammonia, NH_3 , is a gas. It forms a cleaning solution when it dissolves in water. Like most gases, the solubility of ammonia decreases as temperature increases.



Temperature is not the only factor that affects solubility. Solubility of gases is also greatly affected by changes in pressure. Have you noticed what happens when you open a can of soda? Carbon dioxide dissolved in the liquid escapes rapidly from the bottle, sometimes more rapidly than you would like! Carbon dioxide gas is more soluble at higher pressures. When you open the can, you decrease the pressure on the gas, and it comes out of solution.

