



Science

GRADES **5**
6

Scientific Discovery

Dissolve or Not Dissolve

Experiments using various substances to explore solubility, surface tension and diffusion.

What's the Word?

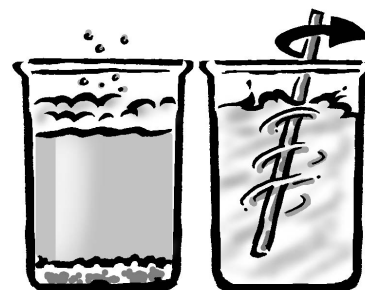
solvent, diffusion, organic, lecithin, surface tension

What's the Mystery?

A solvent is a liquid that dissolves another substance, forming what is known as a solution. Water is sometimes called the “universal” solvent because almost everything dissolves in it. But water cannot dissolve all substances, such as oils and fats. Manufactured solvents, such as turpentine, are used to wash oil-based paints out of brushes. Dry-cleaning fluid is manufactured organic solvent used to dissolve oily spots from clothing. Unfortunately, many organic solvents can be harmful to those who misuse them. Chemists have discovered some solvents that are safer and more effective. One such solvent is made from the oil of soybeans.

What You Need

Kool-Aid, Campbell's chicken soup mix, powdered baking cocoa, Nestlé Nesquik, soy flour, sugar, soybean oil, water, clear plastic cups, stir sticks



What to Do

1. Review the nutrition facts and ingredient labels of the products you will be testing. List which contents are from soybeans?
2. When a material dissolves in water, it mixes with the water, becoming difficult to identify or separate from the water. First, predict which of the materials will dissolve when mixed with cold tap water. Write “yes” or “no” in the blank spaces under the column labeled “Predictions.”

Dissolvability Predictions

Yes No

Test Results

- a. Campbell's chicken soup mix _____
- b. powdered baking cocoa _____
- c. Nestlé Nesquik _____
- d. soy flour _____
- e. sugar _____
- f. Kool-Aid _____
- g. soybean oil _____



3. Fill each glass half full with cold tap water.
4. Place a small amount of the first solute (soup mix) into the solvent (water).
5. Try stirring and mashing the solute into the solution. After a minute, record your results.
6. Repeat this process for each solute, recording your results as you go.
7. Which solute(s) took some stirring before dissolving? Which solute(s) seemed impossible to mix even with stirring and mashing? Which combination best demonstrated the term diffusion, the mixing of two substances without the use of stirring?

What's Going On?

Certain chemicals can be added to a substance to make it more soluble in water. This is demonstrated by the comparison of Nestlé Nesquik to the powdered baking cocoa. Nestlé Nesquik contains the soy ingredient, lecithin. Soy lecithin reduces the surface tension between the water molecules and the cocoa, allowing them to mix easily. The product without the lecithin (cocoa) prefers to remain in its powdery form.

*Adapted from Beans About Water; The Ohio State University Extension, 1996, FS 4-H 602 G.P.
Compliments of the Ohio Soybean Council*



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Scientific Discovery

Through Thick and Thin

Different objects have different densities. So do different liquids, as this experiment demonstrates.

What's the Word?

density

What You Need

- Syrup
- Soy Cooking Oil (most vegetable oils are soy)
- Water
- Piece of Plastic
- Cork
- Grape
- Glass Jar
- Soybeans

What to Do

1. Pour one-third cup of syrup into the glass jar.
2. Now pour one-third cup of soy oil into the jar.
3. Finally, pour one-third cup of water into the jar.
4. Let the contents settle for a few minutes.
5. Drop a piece of plastic, a grape, a few soybeans and a small cork into the liquid.

What's Going On?

Notice how the objects you dropped in settle down to different layers of the mixture. The liquids have different densities. The most-dense liquid (syrup) will be at the bottom, the least-dense liquid (oil) will be at the top, with the water in between. Each object will sink to the level of the liquid that has a greater density than the object. The object will then float on that layer.





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