

1st Place Winner
Structure of Matter
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Particles in Solutions

Grade Level(s): Grade 8

Content Topic(s): Mixtures (solutions)

Materials:

- Large glass measuring cylinder (or glass jar)
- Beans
- Salt
- Cup of water
- Cup of sugar
- Weigh scales (per pair of students)

DESCRIPTION:

In this lesson, the teacher gives a demonstration using sugar and kidney beans to show how dissolving works. Then the students carry out a mass-conservation experiment to show that the substance is still there.

OBJECTIVE:

Many students assume that when something dissolves, it disappears. This lesson will give students a concrete 'picture' that they can hold on to when working out what is happening to the particles.

OBSERVATION & BACKGROUND:

Explain to students that when something dissolves, it breaks down into very small particles. These particles are so small that they can fit between the water molecules, making it seem as if they have disappeared. At this point you may need to talk about what is in between the water molecules, essentially nothing!

EXPERIMENTAL PROCEDURE:

1. Pour the beans into the measuring cylinder and point out that between the beans there is nothing, only air.
2. Now tell the students that you are going to “dissolve” some salt in the beans.
3. Pour in a large amount of salt and allow the students to see how the gaps between the beans are filled up with salt. When the gaps are all full, you are left with salt sitting on the top of the cylinder. You can tell them that this is a precipitate. All the gaps are full and no more can dissolve, so the salt sits at the top. However, explain that a precipitate would normally sit at the bottom.
4. Challenge the students to investigate your claim.
5. Point out that the measuring cylinder with the beans and salt inside will have a greater mass than the measuring cylinder with just the beans. If you are telling the truth, they should be able to duplicate your demonstration with water and sugar. (Sugar is a good solute as it has a greater molar mass and will show a greater change in mass.)
6. Have the students weigh a cup with just water.
7. Next, have them weigh a teaspoon of sugar.
8. Then, add the sugar to the cup, stir to dissolve the sugar, and re-weigh the cup and contents. If your claim is true, the cup and contents should equal the mass of the water added to the mass of the sugar.

ANALYSIS:

Have students complete an activity sheet containing the following information:

Mass of cup and water _____g

Mass of 1 teaspoon of sugar _____g

Add the two numbers above together _____g

Mass of the cup, water and dissolved sugar _____g

What is your conclusion?

MODIFICATIONS OR EXTENSIONS:

As an extension, give the students no instruction on how they are to carry out the sugar water experiment.