

Iron in Your Cereal Demonstration:

Dr. Leslie Pierce

Teacher's Guide

Goals

- To learn about chemicals in foodstuffs
- To let students express their ideas and contribute to learning

The Demonstration

Cereal is soaked with water and stirred for half an hour with a magnet, as a result solid iron sticks to the magnet. Kids make the connection between chemistry and the foods they eat.

Materials

- Total® brand cereal (or other high-iron content cereal)
- A 600 ml glass beaker
- Magnetic stirrer with (optional) hot plate
- Magnet
- Magnetic rod
- Water
- Hourglass
- Optional: 10 ml of 1.0M HCl and 10 ml of 1.0M NaSCN solutions
- An additional 100 ml beaker
- Thermometer

SAFETY

Wear goggles at all times during the demonstration.

Use acid carefully.

Instructions

Fill a 250 ml beaker with cereal.

Pour it into the 600 ml beaker.

Add 250 ml of water to the beaker.

Let the cereal absorb the water.

Insert a Teflon-covered magnet into the cereal and let it stir on the magnetic stirrer for about 30 minutes.

Take the beaker off the stirrer.

Use the magnetic rod to pull out the magnet, but don't touch with your hand.

Put in on a clean hourglass and show the students.

Iron in Your Cereal Demonstration: Teacher's Guide, page 2

Comment

A demonstration of this procedure is fine, but if you want to do a hands-on experiment, make a slurry and divide it to plastic cups/ beakers, for each student.

Optional: demonstrate the acid action of the stomach.

Take about 100 ml of cereal slurry and add to it 10 ml 1M HCl. Heat to 37°C while stirring. Leave for 30 minutes. Add 10 ml of 1.0M NaSCN solution to identify ions of iron.

Lecture Notes

This is a magnet coated with Teflon. We're going to put the magnet at the bottom. We will stir it evenly so we see it spinning around.

We will find something in it that I bet you didn't know was there.

If you recall from biology, two different kinds of digestion occur in the stomach: physical digestion, breaking food-stuffs into little pieces, and chemical digestion, where the acids perform the chemical change on foodstuffs.

[30 min later] Now we have a soggy cereal. I'm going to find the magnet and take it out. I will drip it off a little. But notice that it is not all rinsing off. There's something still there.

I will pass it around and let you see what stays on it.

Iron in your cereal means iron in your cereal!

[Dr. Pierce relates to unexpected initiative of a student to show class what she had seen on TV.]

I have never done it, but if Bill Nye [the Science Guy] can, even Brittany [the student] can. What I'll do about it, is get a strong magnet from physics and leave it there over the weekend.

Teaching Tips From Dr. Pierce

Lots of times students raise questions that we don't anticipate. But we can go to the back room and pull some materials together really quickly, so that they can do the small experiments—and most of it is small stuff.

Today, when we were looking at extracting the iron from the Total [cereal], Brittany said that she saw the Science Guy do it, but differently. So I said, "Let's get the materials that you need; would you like to show it to us?" and she said, "Yes. Why not?"

References: Links

<http://chemmovies.unl.edu/>

Site contains links to hundreds of experiments and activities. Click on "Becker Demo Series" and then on Iron in Cereal "Experiment" to see QuickTime movies of this experiment.

References: Readings

Senozan, N.M., and Christiano, M.P. (1997) "Iron as Nutrient and Poison," *Journal of Chemical Education*, Vol. 74, No. 9, pp: 1060-1064.