Iron in Cereal

Separation of Mixtures

Introduction

Many breakfast cereals are iron fortified; they contain iron as well as many other essential vitamins and minerals. Most people would assume that the iron is in a soluble ionic form and not in its elemental state. This easy demonstration will show that surprisingly, iron is in its elemental state.

Concepts

- Nutrient absorption
- Food content
- Separation of mixtures

Materials

Iron fortified breakfast cereal (e.g., Total™, Special K™, etc.), 1 cup
Blender
Mega-magnet or neodymium magnet
Overhead projector, optional
Petri dish
Plastic cup, clear
Plastic spoon
Water

Safety Precautions

Do not ingest the cereal or water used in this demonstration. Once food is introduced into a laboratory setting, it should be considered a chemical and no longer a food item. Keep magnet away from computers and computer screens and other electronics. Use care when handling strong magnets. The magnet can quickly snap to any magnetic object, resulting in pinched fingers or cracked magnets. Wash hand thoroughly with soap and water before leaving the classroom or laboratory. Please follow all laboratory safety guidelines.

Procedure

Demonstration A

1. Place a few flakes on the lab table or overhead projector.
2. Bring the magnet close to a flake—no attraction is observed.
3. Fill a petri dish with water, adding more water than the dish can hold, so that the water surface is domed slightly above the rim of the dish (see Figure 1).
4. Place a few flakes of cereal in and show how they are attracted to the magnet (you must hold it rather close). *Note:* This works well as a demonstration for the overhead projector.

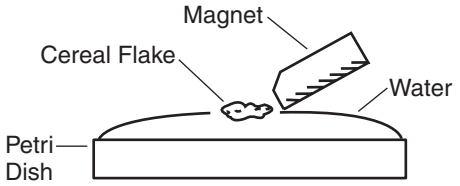

Figure 1.

Demonstration B

5. To actually show the iron in the cereal, place one cup cereal and one cup water in a blender and blend until smooth.
6. Pour the slurry into a plastic cup and, while holding a corner of the magnet to the side of the cup, stir the slurry slowly with a white plastic spoon (see Figure 2).

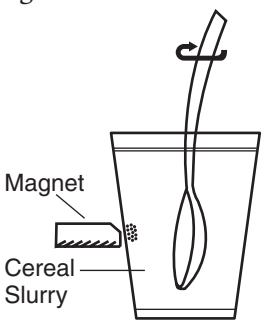

Figure 2.

7. A dark spot will soon appear where the iron filings from the cereal congregate on the inside of the cup. The back of the spoon may be held behind the spot to make it more visible. *Note:* If the blender walls are not too thick, you may be able to forego the cup and just hold the magnet alongside the blender as it blends!

Publication No. 91603
061616

Disposal

The water and milk may be rinsed down the drain. The soggy cereal should be placed in the trash.

Variation of Demonstration

Fill a 1-L beaker about one-third full of crushed cereal. Add enough water to completely cover the cereal. Let the cereal stand until it gets soggy. Put a magnetic stir bar into the beaker and place the beaker on a magnetic stirrer. Stir gently for several minutes. Remove the magnetic stir bar. Observe. Iron metal will be noticeably attached to the stir bar.

Discussion

Does the cereal manufacturer file an iron nail into the cereal? Not exactly. Food grade iron powder is added to the cereal. The iron will react with the acid in the stomach to produce iron ions which are easily absorbed by the digestive tract. Iron is an important nutrient for the hemoglobin in the blood.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Evidence, models, and explanation
Content Standards: Grades 5–8
Content Standard C: Life Science, structure and function in living systems
Content Standard F: Science in Personal and Social Perspectives; personal health
Content Standards: Grades 9–12
Content Standard C: Life Science, the cell, matter, energy, and organization in living systems
Content Standard F: Science in Personal and Social Perspectives, personal and community health

References

Baker, B., et al., CHEM-PACS; Denver, CO, 1989.

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Iron in Cereal* activity, presented by Bob Becker, is available in *Separation of Mixtures*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Iron in Cereal* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP1738	Mega-Magnet
AP1369	Blender, Single-Speed
GP1040	Beaker, Borosilicate Glass, 1 L
AP1088	Magnetic Stirring Bar

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.