

Iron for Breakfast

Introduction:

Our bodies need iron. An iron deficiency can result in anemia, a fairly common condition for adolescent girls. Iron-deficiency anemia can cause fatigue during sports activities because iron is necessary for the blood to carry oxygen to the muscles. Some foods are fortified with iron and can help prevent anemia. In this activity, you'll verify the presence of iron in iron-fortified cereal.

Materials:

Wheaties® or other iron-fortified food that lists iron or reduced iron as an ingredient, such as Total®, Carnation® Instant Breakfast, or iron-fortified grits

2 nonmetallic containers, about 500 mL (2 cups) in volume

1 unsharpened pencil

1 cow magnet

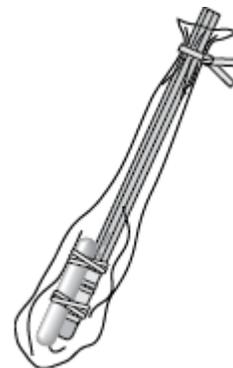
1 plastic bag

1 magnifying lens

3 twist ties or rubber bands

1 piece of white paper or paper towel

water



Procedure:

1. Make a magnetic stirrer by attaching a magnet to an unsharpened pencil using twist ties or rubber bands. Insert the stirrer into a small plastic bag.
2. Remove as much of the air inside the bag as possible and fasten the bag snugly around the stirrer with a twist tie or rubber band.
3. Pour 1 cup of cereal into a nonmetallic container followed by 1 cup of water.
4. Stir the cereal-water mixture with the stirrer assembly made in step 1 for about 1 minute or until the cereal is a fine slurry.
5. Remove the stirrer from the container and gently swirl it in another container of clean water to remove the cereal. Gently shake off excess water or allow to air dry. Do not wipe the stirrer!
6. Over the sheet of white paper, undo the tie from the plastic bag and pull the stirrer out of the bag, allowing any iron filings to fall onto the paper.
7. Do not let the magnet directly touch the iron filings, because once in contact with the magnet, the filings are extremely difficult to remove.

8. Place the magnet under the paper and move it around, observing the magnetic behavior of the filings. Examine the filings with a magnifying lens.

Where's the Chemistry?

Iron is an essential element. Every molecule of hemoglobin (the compound in red blood cells that carries oxygen from the lungs to the tissues) has four iron ions in it. A healthy adult needs about 18mg of iron each day. If all of the iron from your body were extracted and converted into elemental iron, you would have enough iron to make two small nails.

This amount is about 5–7 g. Dietary iron is found in red meats, egg yolks, shellfish, and vegetables such as beans and spinach. Under normal conditions our bodies absorb only 5–15% of the iron in the foods that we eat. To ensure that we have adequate iron in our diets, many foods are iron fortified. Iron can occur in several chemical forms. The iron in the iron-fortified cereal is typically elemental or metallic iron (Fe). While the body is unable to directly absorb elemental iron, the reaction that occurs with hydrochloric acid (HCl) in the stomach produces ferrous iron (Fe^{2+}), which is absorbed in the small intestines.