DETERMINATION OF IRON IN CEREALS

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Introduction:

Most breakfast cereals are vitamin- and mineral-enriched; labels include a specific list, near the top of which is usually iron. This iron in its elemental state can be easily removed from cereal. Its presence can be shown simply and qualitatively; the quantitative method attempts to measure the amount in milligrams. In either case, you may be amazed at what appears on the magnetic stir bar.

Materials:

cereal sample (any brand listing iron as an additive)
copy of label for this brand
stirrer/hot plate
magnetic stir bar
250 mL beaker
deionized water
balance (for quantitative method; preferably electronic, sensitive to two or three decimal places)

Procedure: For qualitative observation, do only steps 1 and 3-5.

1. Crush the cereal sample between the layers of a folded paper towel using the flat bottom of the beaker.

2. For mechanical balance: mass separately the dry beaker and then the dry cereal sample in the beaker. Subtract to find mass of cereal alone. Mass stir bar.
   For electronic balance: mass stir bar; tare the balance with the beaker, add dry cereal, and mass it.

3. Add enough water to cereal to produce a mushy consistency; with a 7 gram cereal sample, 75 mL water is sufficient. More water may be added later to keep it "soup" without affecting the data collected. DO NOT STIR WITH STIRRING ROD AS THIS WILL REMOVE SOME OF THE MASSED SAMPLE.

4. Add stir bar to beaker and place beaker on stirrer/hot plate. Turn stirrer dial to 6 or higher, then back to a setting of 3 or 4. (Optional: Turn heat dial to low setting and heat for 5 - 10 minutes to decrease time for cereal to become mushy.)
5. Let cereal be stirred for as long as time allows; 30 minutes to one hour will give good results. You can tell if iron has been extracted by raising the beaker and looking at the stir bar through the bottom of the beaker. Turn stirrer down before replacing beaker on hot plate; then return to original setting.

6. Carefully pour watery cereal into another container without pouring out stir bar. Remove stir bar with iron attached with forceps or finger and thumb; most iron will be at ends of bar. DO NOT DROP BAR AS YOU WILL LOSE SOME OF THE IRON. If some cereal remains on the bar, gently swish bar in a beaker of water. Remove obvious water drops with a tiny piece of paper towel. Water will not usually stick to the coating on the stir bar.

7. Mass stir bar with iron and determine mass of iron alone. Calculate percentage of iron in this cereal by dividing mass of iron by mass of dry cereal.

Conclusions:

1. Compare the percentages of iron determined by classmates for the same brand of cereal you used. Discuss reasons for any differences.

2. Compare the percentages of iron from different brands of cereal and relate this to label information if available.

3. Given the U. S. R.D.A (recommended daily allowance) for iron (in milligrams) for adults, how could you determine whether your cereal brand meets the percentage of the R.D.A. stated on its label? Describe this procedure.