Measurement of Fe in Cereal
College For Kids

In this experiment you are going to use your photometer with a green LED light source to determine the iron, Fe, content in Total cereal. The Fe is analyzed using a colorimetric method where the ferrous ion is complexed with 2,2-bipyridal to form an intensely colored red complex. The red complex has λ_{max} = 522 nm which is close to the λ = 530 nm maximum output of the green LED.

Initial Extraction from Cereal With a mortar and pestle, grind a couple of grams of Total cereal to a fine powder. Weigh out 1 g of the cereal powder into a 250 mL beaker. Add 25 mL of 5% HNO_3 and swirl. Swirl the beaker occasionally while you work on the rest of the experiment.

Calibrating your Photometer Start by placing a vial filled with water in the sample cell and measure the detector voltage with the LED off. Shield the system from room light so that you get a voltage reading near 5 V. Now turn on the LED and measure the detector voltage with the DI water in the cell. Finally measure the detector voltage for each of the Fe-bipyridal standard solutions. Enter your detection voltages into the excel spreadsheet and print the calibration curve.

Determination of the Iron Content in the Cereal Filter the cereal/HNO_3 slurry through a 2 ply cheese cloth directly into 50 mL volumetric flask. Wash the beaker and slurry with 1 M HCl but do not exceed the 50 mL mark on the flask. After the rinse, dilute the solution to 50 mL with deionized water.

Remove a 1 mL aliquot of this solution and add to a 10 mL volumetric flask. Add in sequence: 0.5 mL 1% hydroxylamine solution, 0.5 mL 2 M sodium acetate solution, and 0.5 mL of 0.1% bipyridal solution. Dilute to the mark with water. Also make a blank using a 1.0 mL aliquot in a 10 mL volumetric and adding all solutions except the bipyridal. Filter the solutions through a syringe filter and measure these in your photometer. **Determine the mass of Fe in the 1 g sample of Total.**