**ACTIVITY: Iron content of foods**

**Activity idea**

In this activity, students qualitatively analyse common foods such as breakfast cereals, parsley and raisins for the presence of the micronutrient iron, which involves a colorimetric comparison method.

By the end of this activity, students should be able to:

* qualitatively compare the iron content of common foods
* explain the term ‘colorimetric method’
* describe in simple terms the iron chemistry involved in this analysis
* effectively and safely manipulate simple laboratory equipment.

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**Introduction/background**

Iron is an essential mineral required by the body. It is central to the structure of haeme, which is the oxygen-carrying part of the protein known as haemoglobin present in red blood cells. Many of the foods we eat contain small amounts of iron, usually in the form of iron compounds.

In this experiment, the amount of iron in some foods will be compared by a simple colorimetric method.

Any iron, either elemental or in compound form, present in the food is mostly converted to the ionic form known as iron (111) on treatment with hydrochloric acid. On the addition of potassium thiocyanate, the iron (111) ions react to form a deep red complex ion. The deeper the red, the higher the concentration of iron (111). By comparing the colour intensities, a qualitative comparison can be made. In this experiment, the more intense the colour of the final solution, the greater is the amount of iron in the food.

The foods to be compared are parsley, raisins and a breakfast cereal like Kellogg’s Nutrigrain.

The chemical reactions occurring are:

Fe in food + HCl(aq) → solution of Fe3+(aq)

Fe3+(aq) + SCN-(aq) → FeSCN2+(aq)

pale yellow colourless deep red colour

***Safety notes***

* Hydrochloric acid is corrosive and needs to be handled with care.
* Safety glasses need to be worn for this activity.

**What you need**

* Samples of parsley, raisins, breakfast cereals like Nutrigrain
* Food composition data tables or information from the back of the packet or similar
* Mortar and pestle for crushing/grinding
* Chopping board and knife
* Spatula and glass stirring rod
* Crucible with lid, tongs
* Top-loading balance accurate to at least 0.1g
* Tripod, clay triangle, Bunsen burner
* 100mL beaker, conical flask, 10mL measuring cylinder
* Medium sized test tubes, stoppers, test tube rack
* Filter funnel, filter paper, white background card
* 2 molL-1 hydrochloric acid
* Distilled water
* 0.1 molL-1 potassium thiocyanate solution
* Safety glasses
* Copies of the student worksheet: [Testing for iron](#testing)

**What to do**

1. Hand out copies of the student worksheet: [Testing for iron](#testing) and have students work in pairs to complete the experiment. Discuss the results.

**Testing for iron**

1. Finely chop or crush the selected food.
2. Weigh out in the crucible 5g of the chopped or crushed food.
3. Heat the food sample gently to begin with and then more strongly until the sample has been completely reduced to ash.
4. When cool, transfer the ash to a 100mL beaker and add 10mL of 2molL-1 hydrochloric acid. Stir the mixture for 5 minutes.
5. Dilute the mixture with 10mL of distilled water and filter into a 100mL conical flask.
6. Measure 5mL of the filtrate into a test tube and add 5mL of 0.1molL-1 potassium thiocyanate solution. Stopper and shake gently. The appearance of a red colour indicates the presence of iron.
7. Place the test tube in the rack.
8. Repeat this procedure for the other selected foods.
9. Compare the red colour intensities of the three foods. The deeper the colour, the higher is the concentration of iron.
10. Look up from the back of the packet or food composition data tables the iron content of these three foods.
11. What did your results show? How do they compare?