

An Example Lesson Plan and Pupil Worksheet for the Global Experiment 2013

Pre-planning

You might want to pre-prepare 10 g of chopped food in a clear plastic disposable cup before the lesson for each team to test. This will be a time saver during the lesson and allows the class to focus on the procedure/maths/results.

Learning Objectives

The aim of the experiment is to find out which fruit or vegetable contains the most vitamin C and to put the class results onto the Global Experiment 2013 website.

Success Criteria

All students will: learn/relearn and revise the starch + iodine turns blue/black colour test and will also relearn that Vitamin C is present in fresh fruit and veg.

Most students will be able to decide which of the two fruit under test has more Vitamin C in it.

Some students will understand that in the mixture, the iodine reacts with the starch and have some appreciation of the concept of calibration in science.

Starter Activity

Watch the video and familiarise your class with the starch test

<http://www.rsc.org/learn-chemistry/collections/online-experimentation/global-experiment/chemistry-week-2013>

YouTube video link:

http://www.youtube.com/watch?v=1P3W9DykGBg&feature=c4-overview&list=UURaqrYgbZAdqCl_tpG150Q

Explain the idea of calibration (without actually using the word), explain that given the variation in the materials and the test conditions, an initial experiment is carried out and then a group calculation will be done in order to work out a 'start point' which is unique to the set of people in the lab. This means that the rest of the experiments will be a 'fair test'.

(Please see Pupil worksheet)

The Lesson Plenary (age dependent but optional recaps)

- Vitamin C (Ascorbic acid) is an antioxidant in addition to having activity as a vitamin
- Multiple resources can be used to talk about: Vitamin C
- http://www.rsc.org/learn-chemistry/collections/chemistry-in-health/content/Vitamin_C.pdf
- Vitamin C itself is oxidised (REDOX) (alternative redox resources are available)
- <http://www.rsc.org/learn-chemistry/resource/listing?searchtext=redox>
- The iodine complexes with starch giving a Blue/Black colour (marking the end of the test)
- You can analyse the data on [Global Experiment website](#), view the different graphs and discuss errors and alternative tests – an example being titrations with a burette
- <http://www.rsc.org/learn-chemistry/resource/res00000539/measuring-the-amount-of-vitamin-c-in-fruit-drink>



Pupil Worksheet

STEP 1 Form an iodine/starch mixture (observe the colour)

1. Make up your starch solution; add a teaspoon of cornflour into a cup and $\frac{3}{4}$ fill it with warm water (stir the suspension)
2. Measure out 100 cm^3 of water into a fresh cup.
3. Add 5 cm^3 of starch solution and then three drops of iodine solution – OBSERVE THE BLUE/BLACK COLOUR. Keep this cup it is useful for comparison in the next step.

Important note: you will need to measure out water and starch again, make sure you know which measuring cylinder you have used for each one.

STEP 2 Calibration (Work out our factor)

1. If you have not already done so make up your starch solution; add a teaspoon of cornflour into a cup and $\frac{3}{4}$ fill it with warm water (stir the suspension)
2. Obtain a soluble vitamin C tablet (1000 mg)
3. Make the calibration solution by dissolving a vitamin C tablet in 1 litre (1000 cm^3) of water.
4. Add 10 cm^3 of your calibration solution in a clean plastic cup and then add 100 cm^3 of water
5. Add 5 cm^3 of starch solution to your cup and stir
6. Carefully add the iodine solution drop by drop to the cup and count the number of drops. Stir the solution gently after each drop. Stop adding drops when the solution turns a blue/black colour. Stir the solution for a further 30 seconds to ensure the colour change remains Note down the total number of drops.....
7. These numbers will be collected and then a class average calculated. This is the average number of drops which were needed to get the blue/black colour

Maths: $10\text{mg} / \text{average no of drops} = \text{FACTOR}$ (we will do this as a group)

STEP 3 Testing the Food: repeated for each

1. Note down what food you are testing
2. If you have not already done so make up your starch solution; add a teaspoon of cornflour into a cup and $\frac{3}{4}$ fill it with warm water (stir the suspension)
3. Prepare or obtain a 10g sample of food to be tested
4. Add your food sample to a fresh clear plastic disposable cup or glass beaker
5. Add water 100 cm^3 to the cup
6. Gently stir the food and water mixture for about a minute.
7. Allow the food to settle. Decant off the liquid into a clean cup.
8. Add 5 cm^3 of starch solution
9. Carefully add the iodine solution drop by drop and count the number of drops. Stir the solution gently after each drop. Stop when you see the persistent blue/black colour (lasts for 30 second or more – compare colour with the cup from the second experiment)
10. Write down the number of drops and display them on a white board.....

In large groups you can average the class data but in smaller groups it is a good idea to repeat steps 1-10 here and average your data

Maths: $\text{class average no. of drops} / 10\text{g food} = \text{drops per gram of food}$

TAKE THIS NO. AND MULTIPLY IT BY 'THE FACTOR' WHICH WE CALCULATED AS A GROUP
 $\text{Drops per gram} \times \text{FACTOR} = \text{mg of vitamin C per gram of food}$ (**this is the result to post online**)

