Get set - investigations with jelly

You and your learners may well have enjoyed a trifle, or other jelly based pudding recently. When following the instructions for making up the jelly you may have noticed some interesting information. If you look at some recipes for setting fruit into jelly [1] you may see a warning about using certain fruits (Figure 1).

This raises several questions which could lead to investigations which are suitable for the primary classroom. Firstly, is it true?

At its most simple level learners could be provided with pots of set jelly and be asked to put various fruits onto the jelly. Although we used a Petri dish for our initial investigation a small amount of jelly set in the bottom of a plastic cup would also be suitable. If left for a few hours any pots to which fresh pineapple is added will not be solid. See Figure 2. Is the same true for the other fruits listed in Figure 1?

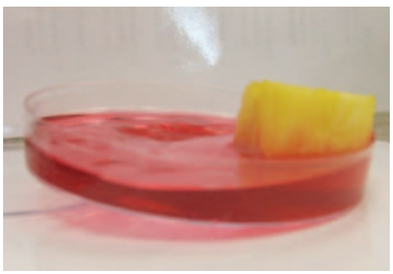

***Figure 2** - When a piece of pineapple is left on it, the jelly becomes liquid.*

Rather than putting fruit onto jelly which has already set, jelly could be poured into cups containing various fruits to see whether the setting process is affected. A cup with no added fruit should be prepared as a control. See Figure 3.

The suggestion in the recipe notes (Figure 1) was to avoid fruits with high acid content - but do the fruits listed have a high acid content? Are there other fruits with similar or higher acid content that do not stop the jelly from setting? See Table 1.

***Figure 1** - Warning not to use fruits which prevent the jelly from setting.*

The fruits which prevent the jelly from setting all contain enzymes from a group known as proteases. These enzymes break up long protein molecules.

The setting agent in jelly is gelatin, a long protein molecule, and as it cools in the jelly-making process the long strands become tangled, trapping the water and thus giving us the familiar wobbly solid we know as jelly. The gelatin used in many commercial jellies is often obtained from animal products but vegetarian jelly options are available.

In the presence of fruits which contain proteases the protein molecules in the gelatin are broken into shorter chains which are unable to trap the water and hence the jelly cannot set.

It is interesting to note that in the case of tinned pineapple the jelly has set. Researching what happens during the canning process [2] can explain this. During the process the foodstuff is heated to a very high temperature. This denatures (makes inactive) the enzyme and thus the gelatin is unaffected by tinned fruit.

By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed - *SCN 2-15a*.

It would appear that the non-setting of the jelly is not linked simply to the acidity of the fruit (see Figures 3 and 4).

***Figure 3** - Anti-clockwise from bottom left: Control - jelly with no added fruit (set), pineapple (not set) and raspberries (set), blueberries (set) and kiwi (not set).*

Fruit	pH
Kiwi	4
Lemon	2
Orange	4
Tinned pineapple	4
Pineapple	3
Raspberry	3
Blueberry	3
Kiwi	4

***Table 1** - pH of fruits used (tested at SSERC).*

Remember - the lower the pH the more acidic the item being tested. The pH of fruits may vary.

***Figure 4** - Results from further testing - orange (set), fresh pineapple (not set), tinned pineapple (set) and lemon (set).*

References

[1] http://www.kidspot.com.au/kitchen/recipes/fruit-and-jelly-cups-2330?ref=collection_view%2Cjelly-recipes (accessed March 2017).

[2] http://www.britannica.com/topic/canning-food-processing (accessed March 2017).