The use of salt in cooking (1)

Introduction

Heston Blumenthal is one of the top chefs in the country – his restaurant, The Fat Duck, has three Michelin stars, the highest rating. He is noted for his scientific approach to cooking – he regularly asks the question '***why?***' rather than accepting what other chefs say, and he devises and carries out experiments to try to find answers.

Heston Blumenthal in The Fat Duck

One question posed by Heston Blumenthal early in his career as a 'scientific chef' was '***Why do cooks add salt (sodium chloride) when cooking vegetables, for example green beans?***' Possible reasons suggested by cooks included:

- it keeps the beans green
- it raises the boiling point of water so the beans cook faster
- it prevents the beans going soggy
- it improves the flavour.

Adding the amount of salt used by cooks does increase the boiling point of water but only by about 0.1 °C – not enough to make any detectable difference to the speed of cooking. Heston was able to find this out by consulting a scientist, Peter Barham from Bristol University.

Your task is to devise experiments that can test if some of the other suggestions are correct. Bear in mind that your experiments must be fair tests and that you must only change one factor at a time if you are to be able to draw sensible conclusions from your results. As well as deciding what to do, you will also have to think about how you record your results.

Scientists do not often use tasting in their experiments so you must take great care with hygiene precautions, especially if you are working in a laboratory. Follow carefully all the precautions that your teacher explains to you.

Cooking with salt

Is it possible to detect which beans have been cooked in salted water and which have not?

Your task is to devise a tasting test to see if it is possible to tell which beans have been cooked in salted water and which in non-salted water. You will need to think about how much salt to use in the cooking water, *ie* what is a realistic amount as used by cooks.

Different people taste things differently and there is no scientific instrument that can measure taste. One way to make a taste test more reliable is to offer the taster three samples, two of which are the same (cooked in salted water, say) and one that is different (cooked in unsalted water). Can the tester tell which is the odd one out? You will have to make sure that there are no other clues, such as colour, as to which sample was salted. You should also think of any other factors which should be kept the same in different samples to make your experiment a fair test.

Apparatus and equipment

Your group will need:

- fresh green beans – about 20 g should be enough. You can cut the beans into short lengths (about 1 cm or so) for tasting
- two saucepans or large beakers (say 1 dm^3)
- access to a cooker or other means of boiling the beans
- access to a top pan balance
- disposable forks or toothpicks to give out lengths of bean for tasting.

Chemicals

Your group will need:

- table salt – about 20 g.

Questions to think about

1. How many times should you try the taste test? How often does the tester get it right? How many testers should you use? Do all the testers get similar results? What other factors will you have to keep the same to make this a fair test?

2. Does the length of cooking time affect the results?

3. You could use similar experiments to test the effect of salt on colour and texture (crispness/sogginess). In each case ask the tester to pick the odd man out from three samples and make sure that there are no clues to indicate which of the samples was cooked with salt. What other factors will you have to keep the same to make this a fair test?

4. Are the results similar for different foods – rice or potatoes, for example?

Safety

- Wear eye protection.
- Follow the hygiene precautions explained to you by your teacher.

Taste testing cooked beans

What level of salt can people detect?

You can make a solution of salt water and successively dilute it (water it down), say by a factor of two each time, checking each time whether the salt can still be tasted. Do the dilution by pouring some of the salt water into a measuring jug, adding the same amount of tap water and stirring. This halves the concentration of the salt. Repeat the process starting with the diluted salt water for the next dilution and so on until the salt cannot be tasted.

One way of making the taste test more reliable is to give the taster three samples, one of salted and two of tap water and ask if they can detect the odd one out. You will need to think about the details of the experiment – what concentration of salt to start with, what dilution factor to use *etc*.

Apparatus and equipment

Your group will need:

- a measuring jug in which to do the dilution
- access to a top pan balance
- disposable spoons for the tasting.

Chemicals

Your group will need:

- table salt – about 20 g.

Questions to think about

1. Do different testers get the same result?

2. Would a test in which the original sample is successively diluted by a factor of ten (rather than two as above) give a more or less precise answer?

Safety

- Wear eye protection.
- Follow the hygiene precautions explained to you by your teacher.