Salt (for cooking)

Download the teacher notes, technician notes and student workbook that accompany this resource at rsc.li/3RGEmQt.

ROYAL SOCIETY OF CHEMISTRY

Learning objectives

By the end of this session, you will be able to:

- Explain some effects of using salt in cooking.
- Describe health concerns associated with salt in the diet.

Salt in the news

How much salt is needed in your diet?

Are we eating too much or too little?

Be careful when reading the news, it is often biased and not always based on sound scientific research.

Salt in the news

BBC

Children's diets 'far too salty'

By Michelle Roberts
Health editor, BBC News online

Salt in the news

Mail Online

One more reason to order takeout: Adding salt to a high-fat diet can help you LOSE weight, claims study

- Iowa scientists gave mice increased levels of salt over 16 weeks
- Suprisingly, the mice who were on high-fat diets gained less weight
- More salt meant that the mice weren't as good as extracting calories from the food eaten, the researchers believe

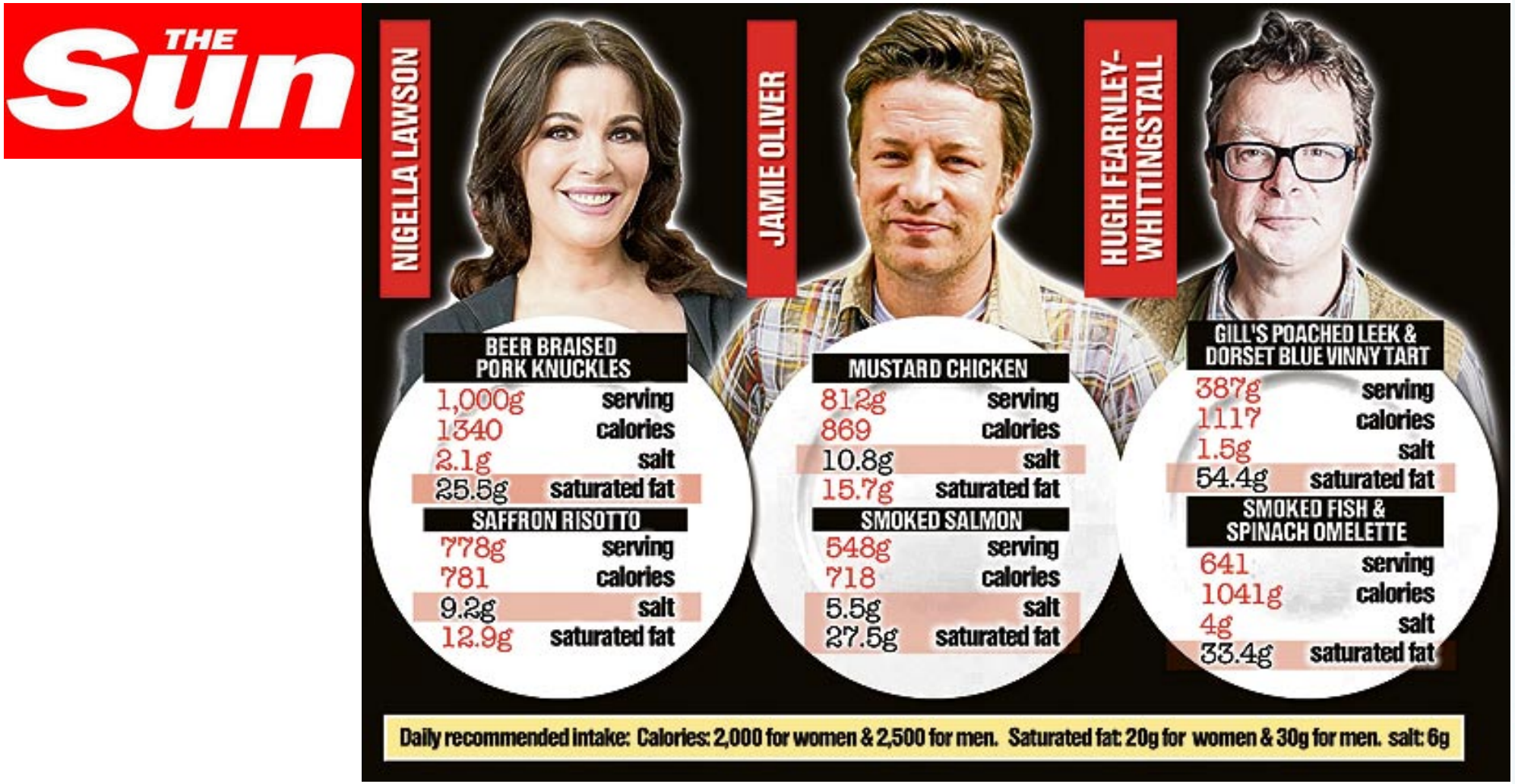
Salt in the news

theguardian
Winner of the Pulitzer prize 2014

Salt: no great shakes for your health

We have known for some time that too much is bad for us, but now researchers are linking increased salt consumption to the rise in autoimmune disease

Salt in the news



Why is salt bad for your health?

Too much salt can lead to high blood pressure.

High blood pressure can lead to many other medical complications, such as kidney failure, heart attacks and coronary heart disease.

So we do have to monitor the amount of salt that we include in our diet.

Why did we start putting salt in our food?

Before refrigeration, salt helped to preserve food.

Salt preserves food by dehydration. It removes water so microbes can’t grow in food.

Salt is still used in preservation but is more commonly used for its flavour rather than its preserving properties.

Why does salt taste so good?

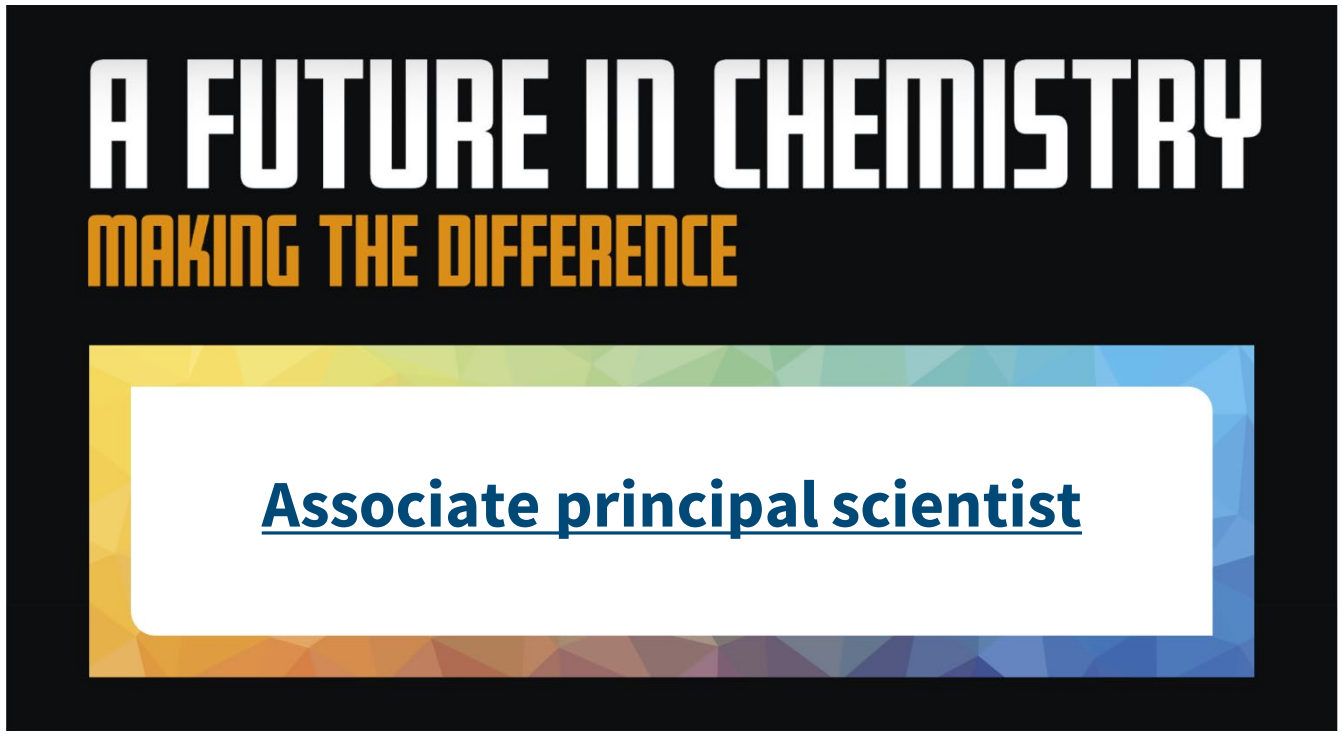
Sodium (Na) in table salt (NaCl) suppresses bitterness in food.

Salt also increases the effect of the sweetness and sourness in food, making the dish taste better.

Career link

Associate principal scientist

Meet Robert, an associate principal scientist, who builds computer models to predict the reactions and interactions between different chemicals to influence the taste and texture of Mondelēz's chocolate and biscuits.



Why do we often add salt to the water when we boil foods such as peas and pasta?

Suggested reasons include:

1. Salt raises the boiling point of water so food cooks faster.
2. Salt prevents the colour of the food from changing.
3. Salt prevents loss of texture in the food.
4. Salt improves the flavour.

Today you are going to investigate whether reasons 1 and 2 are true.

Demonstration: the effect of salt on ice/water equilibrium

1. Drop an ice cube into the ice-cold water.
2. Touch the string to the top of the ice cube.
3. Sprinkle some salt over the ice cube and string and then leave it until the plenary session, when we will observe any changes that may have happened.

Activity 1

How is the boiling point of water affected by salt?

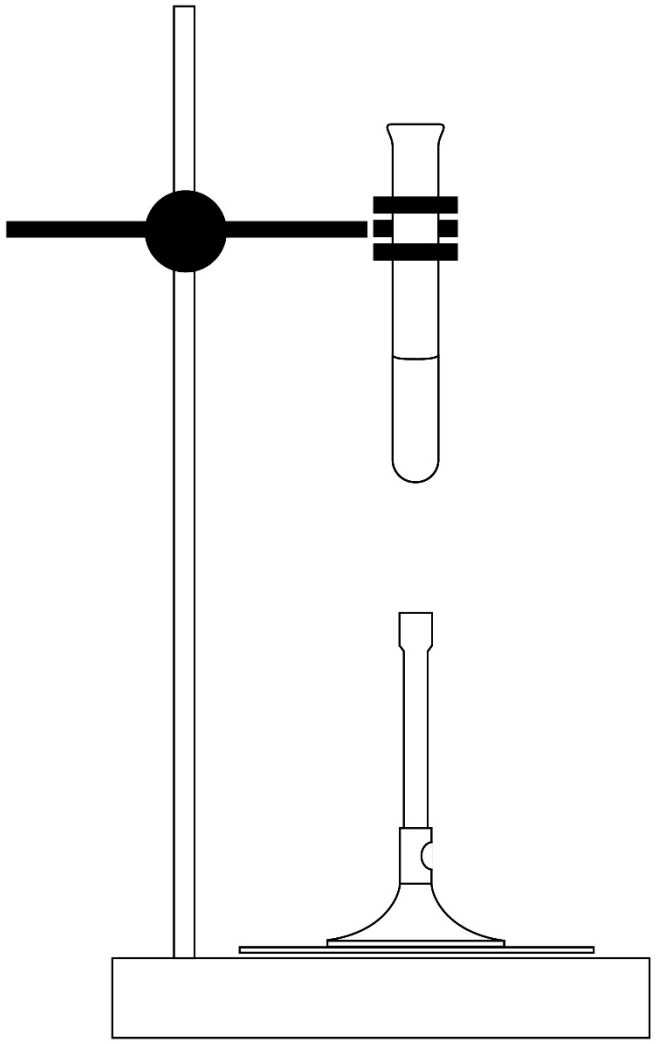
▶ See student workbook

Activity 1

How is the boiling point of water affected by salt?

You will investigate the boiling point of one of three different solutions:

- Solution A has a salt concentration of 0%, made using 10 ml tap water and no salt. This will act as the control for the experiment.
- Solution B has a salt concentration of 18%, made using 10 ml of tap water and 1.8 g salt.
- Solution C has a salt concentration of 36%, made using 10 ml tap water and 3.6 g salt.



Answers

(a) Yes, adding salt does raise the boiling point and would make the food cook quicker.

- Using 1.8 g of salt should produce a temperature increase of approximately 3°C.
- Using 3.6 g of salt should produce a temperature increase of approximately 6°C.

(b) The two masses of salt being investigated here are both higher than the amount you would be likely to add during cooking. The amount of salt used in cooking is only likely to increase the boiling point of the water by about 0.1°C.

Activity 2

Colour changes

See student workbook

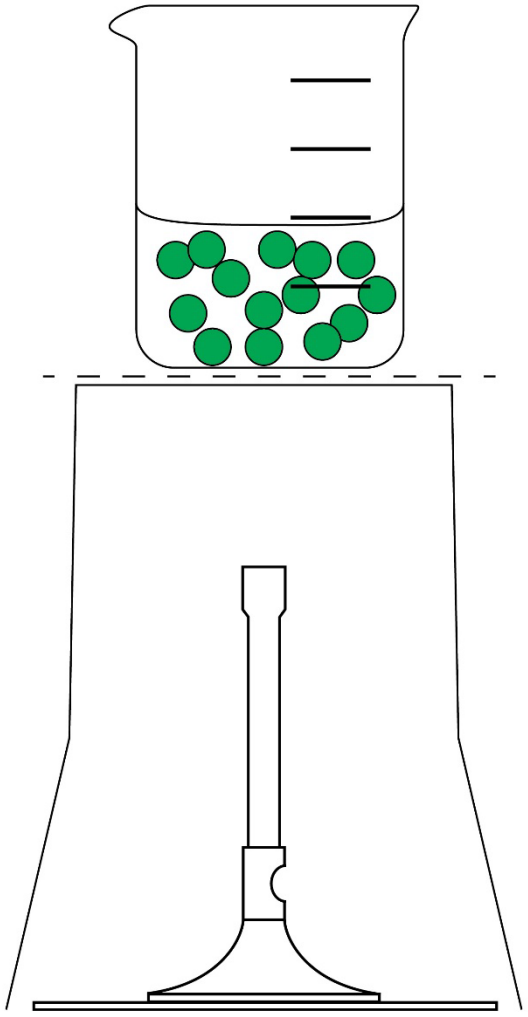
Colour changes

Cooking solutions

D: 100 ml tap water and 18 g salt

E: 100 ml tap water and 2 g bicarbonate of soda

F: 90 ml tap water and 10 ml white vinegar



Vegetables

Peas

Green beans

Green cabbage

Results

(a) The solution containing the white vinegar is acidic and causes the vegetables to look yellow and faded rather than bright green. The solution containing the salt is neutral and keeps the green colour of the vegetables. The solution containing the bicarbonate of soda is alkaline and causes the vegetables to become slightly softer and be much brighter green than they were.

(b) The effects on colour were similar for all the green vegetables.

Career link

Flavourist and innovation director

Meet Claire, a flavourist and innovation director, who uses her chemistry knowledge to develop flavours and technologies to make new food and beverage products.

Plenary

Demonstration: the effect of salt on ice/water equilibrium – explanation

The melting point and freezing point of (pure) water is 0°C. Above 0°C water is a liquid and below 0°C water is a solid (ice).

When you put the ice into the water, the temperature where the ice and water are in contact is 0°C, so the ice starts to melt and the water starts to freeze. As both the ice and the water are at 0°C, the rate of melting and freezing are balanced (are in equilibrium). Adding salt to the surface of the ice lowers the freezing point, so the ice melts.

The temperature where the ice and water are in contact is now below 0°C. To restore the balance (equilibrium), the salt recrystallises out of the water and the water (which is now below its freezing point) refreezes around the string, allowing you to lift the ice cube out of the water by the string.

Acknowledgements

This resource was originally amended and adapted by the University of Reading to support outreach work delivered as part of the Chemistry for All project.

To find out more about the project, and get more resources to help widen participation, visit our Outreach resources hub: rsc.li/3CJX7M3.