

Baking

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Acknowledgements

This resource was originally developed 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.

Learning objectives

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

- Describe the role of raising agents in baking.
- Explain why it is important to follow baking recipes carefully.

As eating is not allowed in science labs, you will only be able to taste the cupcakes if this session is carried out in a food technology classroom or similar.

Career link

Associate principal scientist

Learn about chemistry careers in food by watching Robert's job profile on **slide 14**, also available from rsc.li/3YmUIFS. He works as an associate principal scientist, combining chemistry and computer modelling to predict chemical reactions and develop new flavours and textures of food.

Activity 1: does cake baking require all the ingredients?

Method A recipe

Group A are making the control batch of cakes. These cakes have all the usual ingredients, so they can be compared with the other groups' cakes.

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Metal spoon
- Teaspoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g butter
- 110 g caster sugar
- Two eggs
- 110 g plain flour
- $\frac{1}{2}$ teaspoon baking powder

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of caster sugar and 110 g of butter.
3. Cream sugar and butter together in the mixing bowl using a wooden spoon.
4. Add the two eggs slowly to the mixture, mixing until smooth.
5. Measure out 110 g plain flour and $\frac{1}{2}$ teaspoon baking powder.
6. Fold the flour and baking powder into the ingredients in the mixing bowl until the mixture is smooth.
7. Distribute the mixture between the cupcake cases in the cupcake tin.
8. Bake in the oven at 200°C for 12–15 minutes.

Activity 1: does cake baking require all the ingredients?

Method B recipe

Group B are making the batch of cakes without sugar. What do you think is going to happen?

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Metal spoon
- Teaspoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g butter
- Two eggs
- 110 g plain flour
- $\frac{1}{2}$ teaspoon baking powder

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of butter.
3. Mix together the two eggs and 110 g butter in the mixing bowl as best you can, using the wooden spoon.
4. Measure out 110 g plain flour and $\frac{1}{2}$ teaspoon baking powder.
5. Fold the flour and baking powder into the ingredients in the mixing bowl using the metal spoon and mix until the mixture is smooth.
6. Distribute the mixture between the cupcake cases in the cupcake tin.
7. Bake in the oven at 200°C for 12–15 minutes.

Activity 1: does cake baking require all the ingredients?

Method C recipe

Group C are making the batch of cakes without butter. What do you think is going to happen?

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Metal spoon
- Teaspoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g caster sugar
- Two eggs
- 110 g plain flour
- $\frac{1}{2}$ teaspoon baking powder

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of caster sugar, 110 g of plain flour and $\frac{1}{2}$ teaspoon of baking powder.
3. Add all the dry ingredients together in the mixing bowl.
4. Add the two eggs slowly to the mixture in the mixing bowl and mix until you have a smooth paste.
5. Distribute the mixture between the cupcake cases in the cupcake tin.
6. Bake in the oven at 200°C for 12–15 minutes.

Activity 1: does cake baking require all the ingredients?

Method D recipe

Group D are making the batch of cakes without flour. What do you think is going to happen?

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Teaspoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g butter
- 110 g caster sugar
- Two eggs
- $\frac{1}{2}$ teaspoon baking powder

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of caster sugar and 110 g of butter.
3. Cream together the sugar and the butter in the mixing bowl using the wooden spoon.
4. Add the two eggs slowly to the mixture in the mixing bowl and mix until you have a smooth paste.
5. Add $\frac{1}{2}$ teaspoon of baking powder to the mixture and mix this in.
6. Distribute the mixture between the cupcake cases in the cupcake tin.
7. Bake in the oven at 200°C for 12–15 minutes.

Activity 1: does cake baking require all the ingredients?

Method E recipe

Group E are making the batch of cakes without baking powder. What do you think is going to happen?

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Metal spoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g butter
- 110 g caster sugar
- Two eggs
- 110 g plain flour

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of caster sugar and 110 g of butter.
3. Cream together the sugar and the butter in the mixing bowl using the wooden spoon.
4. Add the two eggs slowly and mix until you have a smooth paste.
5. Measure out 110 g plain flour and fold it into the mixture using the metal spoon.
6. Distribute the mixture between the cupcake cases in the cupcake tin.
7. Bake in the oven at 200°C for 12–15 minutes.

Activity 1: does cake baking require all the ingredients?

Method F recipe

Group F are making the batch of cakes without eggs. What do you think is going to happen?

Equipment

- Mixing bowl
- Measuring scales
- 12 cupcake cases
- Cupcake tin
- Metal spoon
- Teaspoon
- Wooden spoon
- Oven gloves

Ingredients

- 110 g butter
- 110 g caster sugar
- 110 g plain flour
- $\frac{1}{2}$ teaspoon baking powder

To do

1. Put 12 cupcake cases into the cupcake tin.
2. Measure out 110 g of caster sugar and 110 g of butter.
3. Cream together the sugar and the butter in the mixing bowl using the wooden spoon.
4. Measure out 110 g of plain flour and $\frac{1}{2}$ teaspoon of baking powder.
5. Fold the plain flour and baking powder into the mixture in the mixing bowl using the metal spoon.
6. Distribute the mixture between the cupcake cases in the cake tin.
7. Bake in the oven at 200°C for 12–15 minutes.

Activity 2: baking ingredients

To answer

1. Why are each of these ingredients used?

(a) Flour

(b) Sugar

(c) Eggs

(d) Baking powder

(e) Butter

2. How are your cakes going to look?

3. What is the texture going to be like and how will they taste?

4. What do you think will happen to the other groups' cakes? Why?

Activity 3: tasting the cakes

Method used	Appearance	Smell	Taste	Texture
A				
B				
C				
D				
E				
F				