Investigation 2

Aim

Investigating the effects of temperature, cooking time and additional ingredients when making a baked egg custard.
(Note: you are going to make a control sample, following the standard recipe. You will then make additional samples with variations to ratio of ingredients, cooking temperature, cooking time and additional ingredients, and you will compare these results with your control – you can select some variables if all variables are not practicable.)

Equipment

- Digital scales
- Digital timer or stopwatch
- 1 oven preheated to 160°C or 140°C if using a fan oven
- 1 oven preheated to 250°C or 230°C if using a fan oven
- Ovenproof dishes (ramekins are ideal)
- Measuring jug
- Fork
- Saucepan
- 4 shallow metal baking tins
- Kettle, with freshly boiled water (water needs to be warm rather than hot)
- Sticky labels and marker pen
- Oven gloves
- Digital camera

Ingredients

Control sample:

- 25 g whole egg (beaten)
- 12 g caster sugar
- 100 ml milk

Variations

- **Variation 1** – omit the sugar from control recipe.
- **Variation 2** – increase the sugar from control recipe to 25 g.
- **Variation 3** – use 1 egg white instead of 25 g whole egg (approx. 25 to 30 g egg white).
- **Variation 4** – use 1 egg yolk instead of 25 g whole egg (approx. 12 to 15 g egg yolk).
- **Variation 5** – use 50 g whole egg instead of 25 g whole egg.
- **Variation 6** – increase the milk from control recipe to 200 ml.
- **Variation 7** – use the control recipe, but add cold milk.
- **Variation 8** – use the control recipe, but do not cook in a water bath (cook at 160°C or 140°C if using a fan oven).
- **Variation 9** – use the control recipe, but increase the oven temperature to 250°C (230°C if using a fan oven), in a water bath.
- **Variation 10** – use the control recipe, but increase the oven temperature to 250°C (230°C if using a fan oven), this time without a water bath.

- Variation 11 – use the control recipe, but increase the cooking time by an additional 30 minutes.
- **Variation 12** – use the control recipe, but also add in 15ml freshly squeezed lemon juice. Stir this in once the warm milk has been added to the egg and sugar mix.

Method

Control sample:

Preheat oven 1 to 160°C (or 140°C if using a fan oven) and oven 2 to 250°C (or 230°C if using a fan oven).

In the measuring jug, lightly beat the egg and sugar together with a fork.

Warm the milk in the saucepan until it steams – approx. 80°C.

Pour the warm milk into the egg and sugar mix and stir until well mixed.

Pour the mixture carefully into the ramekin style ovenproof dish.

Label the sample and then prepare the remaining samples.

When all the samples are made:

- stand the samples in the shallow metal baking tin. Pour in warm (not hot) water from the kettle so that it comes up the side of each ovenproof dish – this acts as a bain-marie (water bath). The samples are baked at 160°C (oven 1 to 160°C or 140°C if using a fan oven) in a water bath, so that they can all be cooked together
- bake the custards until set – approx. 40 minutes.

How will you know when the custard is set?

Allow the samples to cool. Then, review the sample and complete the results table.

Results

Create a table to record your results:

	Image of baked egg custard	Colour of surface	Texture of skin on top	Does the custard appear to have shrunk?	Remove custard from oven proof dish	Describe the texture of the set custard when removed from the dish. Smooth and even? Any bubbles? If so, describe their size.	Cut the egg custard in half – is it firmly or softly set?	Is there any sign of synerisis (water seepage)?
Control								
Variation 1								
Variation 2								
Variation 3								
Variation 4								
Variation 5								
Variation 6								
Variation 7								
Variation 8								
Variation 9								
Variation 10								
Variation 11								
Variation 12								

Conclusions

Summarise your findings here. You should consider:

Which recipe produces the best quality baked egg custard? Give an explanation.

What happens if sugar is removed? Does it affect the setting quality of the baked egg custard?

Which produces the best set egg custard – whole egg, white egg or egg yolk? Explain your answers scientifically.

Why is it important to warm the milk?

What is the most effective way of achieving a smooth, velvety and shiny finished custard, which is free from holes?

What is the optimum temperature for cooking the egg custard?

What happens if acid is added to the mixture?

What happens if the egg custard is cooked for longer than is needed for the egg custard to set?

Is a water bath really necessary? Explain your answer.

What has caused holes in some of the samples?

Explain the differences caused by variations in sugar and egg.

Extension task

Consider the following questions:

What do you think is the effect of sugar on the final egg custard? If you experimented with cooking times, do you think you could perfect the finished result?

Discuss and explain the differences in texture and flavour between Variation 3 (egg white) and Variation 4 (egg yolk).

Do you think that it is possible to make an acceptable egg custard with egg white only? How would you do this, and what changes would you make to the control recipe?

Develop your results to include sensory testing of the baked egg custard samples. Consider the different methods of sensory testing you can include.