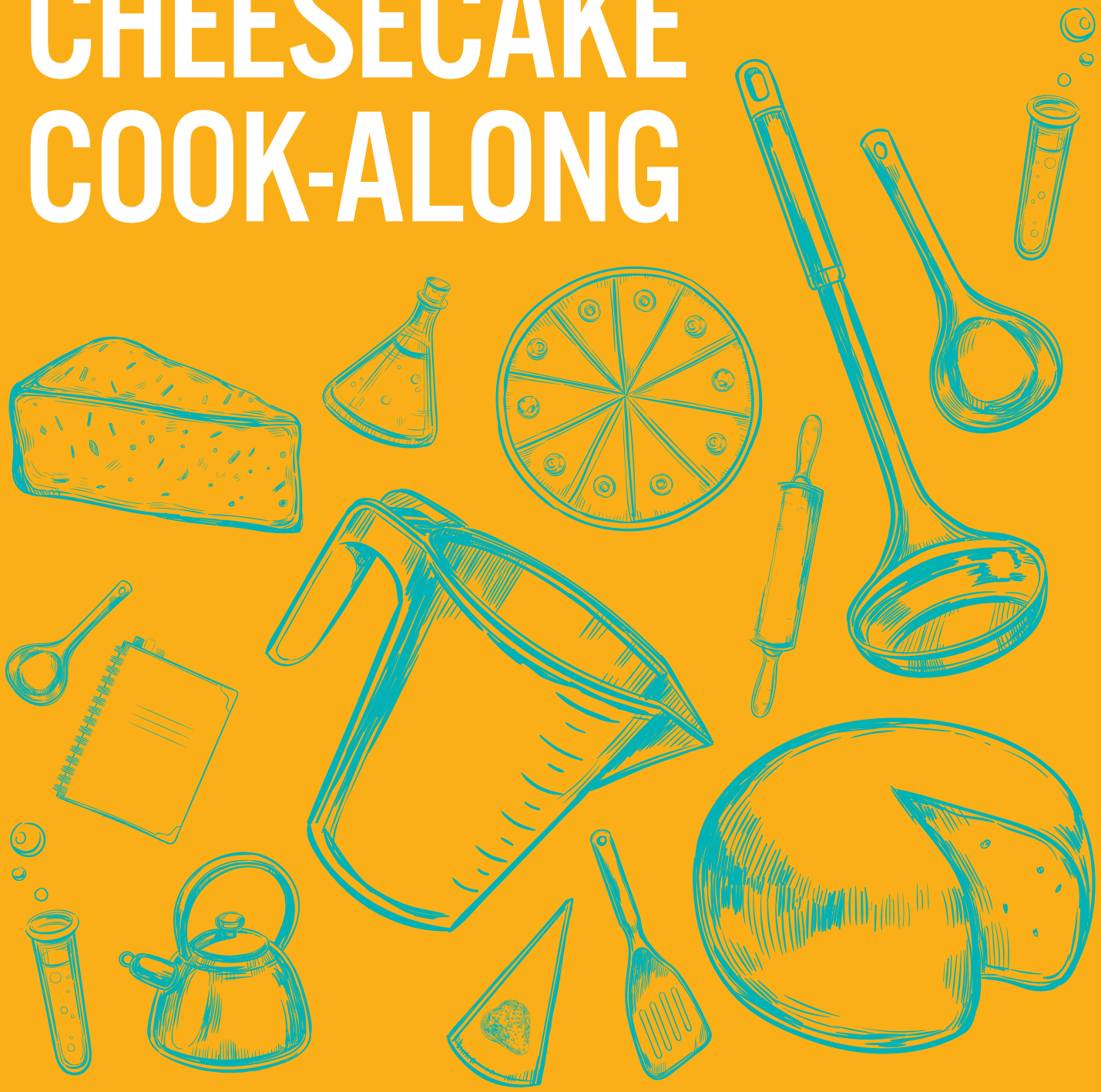
THE GREAT EXHIBITION ROAD FESTIVAL

Chemical Kitchen:
Imperial College London and Kitchen Theory

CHEESECAKE COOK-ALONG



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WHAT IS CHEMICAL KITCHEN?

Some of you may be thinking ‘Why is Imperial College London teaching me how to cook?’

The answer to this question lies in the many parallels between the worlds of gastronomy and science.

In their daily work, chefs set up their workplace with the necessary tools and ingredients. They follow recipes, taste, observe, and evaluate their products while keeping everything clean and safe. They do this day after day trying to make the process as reproducible as possible. All this requires a high level of craftsmanship, dexterity, and the ability to improvise in response to the unexpected.

The work of a scientist involves a similar process – researchers set up their laboratory equipment and follow protocols, all while measuring, observing, and evaluating their products, keeping their workspace clean and safe. Thus, a high level of craftsmanship, dexterity, and the ability to adapt is crucial to both chefs and scientists.

This overlooked parallel has been noticed by Jozef Youssef, chef patron at Kitchen Theory, and Professors Roger Kneebone and Alan Spivey of Imperial College London, leading to the inception of the Chemical Kitchen at Imperial.

The Chemical Kitchen is an original, interdisciplinary laboratory aimed at introducing students to the mindset and basic skills needed in a chemical laboratory (and kitchen!).

What to expect from the Chemical Kitchen cheesecake cook-along

The Chemical Kitchen cheesecake cook-along consists of tasks that you will perform in your own kitchen. During these tasks, you will prepare a simple curd cheese and an agar jelly.

At the end of the tasks you will use your products to assemble a cheesecake. You will have full creative freedom in the design of your cheesecake, where you may prepare a traditional New York cheesecake, or reinterpret this classic in devising a modernist cheesecake dish.

You will be able to follow along in the live Cheesecake cook-along, where Chemical Kitchen experts Jakub and Luke will explain the steps and show you how make the cheesecake at home.

WHAT DO YOU NEED TO GET BEFORE THE COOK-ALONG:

Ingredients

Cheese:
- 1L of cow's milk or soya milk
- 1–2 lemons

Cheesecake base:
- Cookies, such as digestive biscuits
- Butter or coconut oil
- Sugar

Agar jelly (optional):
- 2–6g agar
- A fruit cordial or other sweet, flavourful liquid such as tea or coffee
- Any other ingredients you want to use to top your cheesecake – like fresh fruit, jam or herbs

Equipment

For making cheese:
- A sieve and a cheesecloth, or a clean tea towel
- A pot and a stove
- Kitchen scales
- Spoons

For agar jelly (optional):
- A tray, a liquid dropper, silicone tube
- A mug full of vegetable oil, frozen in a freezer

For assembly:
- Metal ring (optional)
- Knife for chopping fruits for topping (alternative to agar jelly)

WHAT IS IN OUR CHEMICAL COOKBOOK?

TASK 1: MAKE YOUR OWN CHEESE OR VEGAN CURD

Background

The original purpose of cheesemaking was to preserve milk, and dates as far back as the Bronze age, 3000 BC. Making cheese is based on denaturing the milk protein, traditionally with acid, coagulating it and removing the water in the form of whey. It can involve culturing the milk with bacteria, using enzymes, maturing the curdled milk, and using moulds and bacteria to change and enhance the flavour of the curds. It can be crumbly or melty, mild or sharp, smell sweet or smell awful. This tasty food is one of the most widespread and varied foods around the globe, with many traditions and customs around it.

Tofu is a product made from soy milk which involves coagulating the protein, traditionally with magnesium chloride or similar salts, and removing the water from the curds. It has been made in Asia for more than 2000 years and is a good, low-calorie source of protein. It also comes in many different varieties, ranging from soft to very firm, depending on the method used to make it. Its texture can be changed by freezing, to make it porous and sponge like. It can be fermented with bacteria or moulds, and its pungency can compete with even the most stinky cheeses.

Cheese and tofu are thus very similar products, where a protein-rich liquid is mixed with an agent that causes the protein to coagulate. The coagulated protein curds are then strained and pressed to form a solid food product.

Cheese or vegan curd recipe

Ingredients:
750mL whole cow's milk or 500mL soy milk
25mL lemon juice

1. Measure out the milk.
2. Measure out the lemon juice.
3. Using a pan and a stove, bring the milk to boil.
4. Remove the pan from the stove and turn off the heat.
5. Add the lemon juice to the milk. Mix gently and briefly using a motion with a spatula or spoon that goes around the edge of the pot once and then once through the centre of the mixture. Leave the mixture to stand undisturbed for 15 minutes.
6. Transfer the coagulated milk to a strainer lined with the cheesecloth bag, set over a bowl and filter out most of the whey.
7. Remove the cheese from the cloth. You can use it immediately or shape it in a container and keep in the fridge.

TASK 2: MAKE THE COOKIE CRUMB CHEESECAKE BASE

Cookie crumb cheesecake base recipe

Ingredients:
- 50g cookies or biscuits
- 25g fat (use fats that are solid when cold such as coconut oil or butter)

1. Crumble the cookies and melt the fat if it is solid.
2. Mix the cookies with the melted butter/coconut oil and press into a cheesecake base.

Or why not make a simple shortcrust pastry base?

Ingredients:
- 100g flour
- 50g fat (use fats that are solid when cold such as coconut oil or butter)
- 2g salt
- 1–2 teaspoon water

1. Rub the fat into the flour until you get a sandy texture.
2. Add the water and work the dough until it creates a solid mass, wrap in cling film and rest in the fridge for at least 30 minutes.
3. Roll the cold pasty out and place into a lined a baking mould, (optional – if possible, weigh the dough down with a tin or oven proof dish to stop it puffing up) and bake at 180°C for 10–20 minutes until golden.

TASK 3: MAKE THE AGAR JELLY

Background

Your second task is to prepare an agar gel. Agar gels are often used in kitchens, but also in laboratories. In kitchens, they are usually used to create jellies or purify juices. In laboratories, they are used for instance as a solidifying agent for microbiology growth media, as well as for other experiments like DNA electrophoresis. The peculiar behaviour of agar-based gels is that their melting and setting points are different – a set gel needs to be heated to a high temperature in order for it to melt, and a liquid solution needs to be cooled to a low temperature in order to set.

AGAR JELLY RECIPES

Flavoured liquid

You may start from a sugar solution base or use a fruit juice base. Be aware that some recipes require fat free liquids to work.

Sugar base – a common sugar 'stock solution' can be prepared by dissolving 100g sugar in 100mL water by boiling it in a pot.

Citric acid or lemon juice – this can be added (in small amounts) to taste in order to enhance the tartness of the liquid.

Agar tagliatelle/flat shapes

Ingredients:
- 100mL liquid
- 1–2g agar

1 Weigh out all the ingredients.

2 Mix the agar into the liquid. Boil in the microwave or on a stove top until agar is completely dissolved.

This process must be monitored carefully as when while the mixture is boiling as the contents will rise up the container. The microwave should be stopped intermittently to prevent overflow of the boiling liquid.

3 Quickly pour the liquid onto a metal tray and tilt the tray to spread it around. The gel will set very quickly producing a thin solid sheet.

4 For tagliatelle, cut the set gel into strips using a pallet knife. Alternatively, cookie cutters may be used to cut shapes from the gellan sheets.

Agar flavoured shapes

Using the same recipe as for the agar tagliatelle, the mixture can be poured into any kind of moulds or containers and allowed to set to create a variety of flavoured gummy treats (using 2g agar works well for this)! Set the moulds on a tray and in the fridge to set them quickly. After they are set, you can also cut them into smaller pieces.

Here are some other exciting and creative things you can do with agar jelly!

Please note, additional equipment may be required...

Agar spaghetti

Ingredients:
- 100mL liquid
- 1–3 g agar – the more agar you add, the firmer the resulting solid will be.

1. Weigh out all the ingredients.
2. Mix the agar into the liquid and boil in the microwave or on a stove top until completely dissolved.
3. Attach silicone tubing to empty syringe. Aspirate the liquid into the syringe through the tubing to prevent air bubbles.
4. Place the silicone tubing in a cold-water bath. Wait for a couple of minutes for the agar to solidify.
5. Remove the tubing from the cold water bath.
6. Use another syringe filled with water to push out the gelled liquid from the tubing.

Cold oil spherification – small solid/chewy flavoured spheres

If you want to perform cold oil spherification, you need to freeze vegetable oil in a mug the day before you do the spherification.

Ingredients:
- 100mL liquid
- 2g agar
- Cold oil bath (at least 250mL)

1. Place a container with vegetable oil (almost full) in the freezer.
2. Dissolve the agar in 100mL of liquid by boiling it in the microwave oven or on a stove top for 1–2 minutes until agar is completely dissolved.
3. While hot, mix with food colouring and flavourings (if desired) using a metal spoon.
4. Take up the hot liquid into a plastic pipette.
5. Dispense the liquid drop by drop into the cold oil. Spherify 25mL of the solution at most, then go to step 6.
6. Pour the entire contents of the oil bath (oil + spheres) through a sieve such that the oil drains into a second container. If the oil is still cold, you can repeat step 5 to make more spheres.
7. While the spheres are in the sieve, rinse them thoroughly with cold tap water and finally transfer them to a small bowl.

TASK 4: ASSEMBLING THE CHEESECAKE

Baked cheesecake

Ingredients:
- 100g curd cheese, mashed into a paste
- 25g butter, softened
- 25g caster sugar
- 1 egg
- 5g cornstarch

1. Mix all the ingredients into a smooth paste.
2. You can flavour the mix with vanilla, finely grated lemon skin or other dry spices.
3. Now put your cheesecake filling in the metal ring on top of your pressed down biscuit base.
4. Bake at 160 °C, until the centre of the cheesecake registers 80 °C on a thermometer or when the cheesecake is set.
5. Chill in the fridge for at least 3 hours.
6. Now its time to top your cheesecake! If you made agar jelly you can put this carefully on top or around the cheesecake on the plate. If you are topping with jam, fruits or herbs, you can add these however you like!

Fridge-set cheesecake

Ingredients:
- 100g curd cheese, mashed into a paste
- 25g caster sugar

1. Mix all the ingredients into a smooth paste. You can flavour the mix with vanilla, lemon or spices.
2. If you would like to put fruit around the edge like in the pictures below, cut the fruit into thin slices and stick to the inside edge of the metal tin.
3. Now carefully add your cheesecake filling on top of the base, careful not to dislodge the fruit.
4. Add agar jelly or fruit on top as you wish. Refrigerate for 3 hours before serving.

KITCHEN SAFETY AND FOOD HYGIENE

1. If you have any food allergies, make sure you do not use these ingredients in your cooking.
2. Some advice on what to wear:
    - If you have one, an apron is great
    - Wearing flat-bottomed, closed toe shoes is much better than sandals, flip-flops or high heels.
    - Wearing long sleeves and trousers helps to cover and protect your skin from heat and irritating agents
3. Tie back long hair.
4. Do not run in the kitchen area.
5. Try not wear headphones or play very loud music in the kitchen area, so you are aware of your surroundings to work safely.
6. Wash your hands with soap before cooking. Also wash your hands each time after you sneeze, cough, lick your fingers, touch your nose etc.
7. Clean as you go! Wash your tools, glassware, and bench space. Keep everything tidy and organized. Dispose of waste properly using the general waste (black bag) bins or recycling containers as appropriate.
8. Do not ‘double-dip’. If you use a spoon to taste something, wash the spoon before tasting again.
9. Chill hot foods within 90 minutes.
10. Store all food in the fridge.