



The chemistry of baking - baking scones

A basic scone recipe can take you along way. It is fun, easy and a great way to experiment as well. If you do not have all the ingredients you can improvise! Once you have mastered the basics, you can experiment with adding new ingredients like cheese, pumpkin, sultanas, dates, lemon peel or blueberries. Perhaps not all at the same time – but who knows?

What's the STEM?

There is a lot of STEM in cooking. In this activity, we are focussing on the chemistry of cooking by analysing the raising agents and how they work. It links very well to the red cabbage chemistry activity but can also be a stand-alone activity.

Baking powder is a mixture of powders – sodium bicarbonate (baking soda) and powdered acid. Most have a filler that helps it stay dry and keeps it fresh. If you eat gluten free you need to be careful as some baking powder contains wheat products.

You can make baking powder by combining baking soda and citric acid powder or tartaric acid powder. Baking soda is alkali and mixing it with acid causes a reaction which releases carbon dioxide which adds the bubbles in cakes, pancakes and, of course, scones.

Method

This is the basic recipe. For all the alternative ingredients see below.

Start by pre-heating your oven to gas 6/ 200 C. Add 3 cups of self-raising flour to a large bowl (if you only have plain flour at home, please refer to the step 'No self-raising flour' below). Rub in the butter by cutting it into little cubes and squishing them through your fingers and mixing them slowly with the flour. Then add the milk to form a dough. Cut scones, place them on a lined tray and pop in the oven for 20 mins.

There are obviously more detailed (and complicated) recipes out there, but let's start with the basics.

Observations, conclusions, ideas

We have been making a lot of scones at Little Scientists. In fact, we make a batch here at home most days using a different recipe and finding out what works (and what doesn't). We have found that if you have a complete failure the results still taste good dipped in chocolate. In fact, we have found out that most things taste good dipped in chocolate. Having said that these are our results. Why not let us know yours?

Equipment list

- 3 cups plain flour or self-raising flour
- 1 cup milk
- ½ cup butter, margarine or oil
- Baking tray
- Mixing bowl
- Raising agents can be baking soda, baking powder, citric acid, tartaric acid, lemon or lime juice
- Raising agent - only needed if you don't have self-raising flour

So what happens if I am missing one of those ingredients? This is where the magic and the chemistry of baking happens:

No self-raising flour

Bicarbonate of soda is a pure raising agent. It needs to be mixed with something wet and acidic to start the chemical reaction and make food rise.

To 3 cups of plain flour add one of the following:

- 6 tsp of baking powder or
- 1 tsp of bicarb soda and 2 tsp of cream of tartar or
- 1 tsp of bicarb soda and 2 tsp tartaric acid powder or
- 1 tsp of bicarb soda and 2 tsp citric acid powder or
- 1 tsp bicarb of soda and 2 tablespoons of lemon juice in the milk

No butter or margarine

- Any fat such as coconut oil, canola oil, olive oil or sunflower oil

No milk

- Any other milk - oat, cashew, almond, soy
- Water
- Lemonade (works really well)

No flour

- Gluten free flour
- Rice flour, besan flour, chakki atta

No baking soda or baking powder

I haven't tried this but here is a recipe if you don't have either!

<https://cookpad.com/uk/recipes/144426-crispy-scones-without-baking-powder>

Extended learning

Red Cabbage Chemistry

Besan flour has a really strong taste. I tried them with large amounts of cheese and they were still interesting. I also suggest adding a squeeze of lemon to help them rise. Weirdly enough my husband loves them. If anyone has a better recipe, please share with us.

Note

