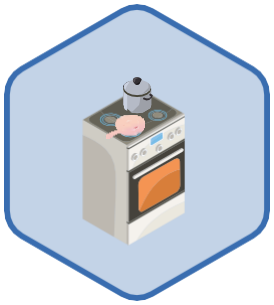
TO FORK



Quality Meat Scotland

The Science of Cooking with Meat

This worksheet can be carried out as an individual task or can also be done as a group.

Name:	Class:	Date:

The Science of Cooking with Meat

The science of food is always interesting – food is a science. Do you know the name of the chemical reaction that occurs during the cooking of meat? It is called the Maillard Reaction. It is often described as the 'browning reaction', involving amino acids and simple sugars, but it's not a simple process. It should really be called the 'flavour reaction' due to the aromas created.

Watch the videos and read the article below to learn about the Maillard Reaction:

https://youtu.be/SLAz3oiMi8Q (FDF/QMS)

https://vimeo.com/301158340 (Part 1 Chemistry World)

https://vimeo.com/301159527 (Part 2 Chemistry World)

https://www.chemistryworld.com/features/the-marvellous-maillard-reaction/3009723.article (Article)

Experiment - Smell the Maillard Reaction

Did you know you can in fact smell the Maillard Reaction and those familiar aromas we get when cooking meat or other foods, such as toast or coffee, without even using the actual foods? You can achieve this by mixing Amino Acids with sugar.

We recommend teachers or guardians to supervise this experiment as the syrup gets very hot, very quickly.

What you'll need:

- Golden Syrup or any other syrup available
- Amino Acid caplets (available from health food stores)
- Non-stick frying pan
- Teaspoon
- Oven gloves

Method:

- Add approx. 1 teaspoon of Golden Syrup to the frying pan
- Open one of the Amino Acid caplets and let everyone smell the powder inside – is there a distinctive odour?
- Add the Amino Acid powder to the syrup in the frying pan
- Turn the heat up to high
- Move the frying pan around to disperse the powder/syrup mixture – let it heat up and become more liquid. As it heats up, do you smell any distinctive odours? As it continues to heat, can you smell any other odours? What colour has the mixture turned to?

What's happening?

When Amino Acids and sugars are heated, they interact by means of the chemical reaction the Maillard Reaction. Using different Amino Acids will provide different aromas and mixing them will create even more. You may have noticed a brown colour developing too, this is because of the high temperature.

If you've not already tried it, mix different Amino Acids together to the syrup and see which aromas occur. Take a note of the different aromas different people smell.

Questions	
1	Complete the below statement from the following options to explain the Maillard Reaction: Enzyme, Heat, Amino Acid, Sugar, Water, Browning, Colour, Roasting, pH, Time **Protein + + = + flavour**
2	In what way is the Maillard Reaction different from enzymatic browning?
3	Describe how the Maillard Reaction is different from caramelisation.
4	Look at the two beef joint images below. In which one has the Maillard Reaction occurred most, and why?
	 
5	List 5 other foods in which the Maillard Reaction takes place.