Carbohydrates —Functional and chemical properties 2.2.2

Key words:

Caramelisation: The breaking up of sucrose (sugar) molecules when heated = a change in colour, flavour + texture of the sugar as it turns into a caramel.

Dextrinisation: The breaking up of starch molecules into smaller groups of glucose molecules when they are exposed to dry heat

Gelatinisation: the swelling of starch granules when they are cooked with a liquid to the point where they burst and release starch molecules

Dextrinisation:

when foods containing starch e.g. bread, cakes, biscuits, scones and pastries are cooked using dry heat e.g. baking = grilling, they change to a brown colour on the outside.

Dry heat (oven/grill) causes starch to change colour, texture and flavour.

The starch molecules break down to change to dextrin (a smaller group of glucose molecules)

Caramelisation

Sugar (sucrose) used for cooking (disaccharide made from glucose + fructose) is heated and melts to a syrup. The syrup boils. It is important **not to stir** the syrup as it caramelises.

The sucrose molecules break up and water molecules are formed.

As heating continues, water evaporates, the syrup gets thicker and changes from a colourless and clear syrup to a golden brown

caramel. If you stir, the sugar will **crystallise** into large, hard lumps. The ideal temperature of caramelising sugar is 160°C to 170°C.

It will eventually burn and become bitter if cooked for too long

because too much water is driven off and carbon is left behind, which makes the caramel dark and bitter.

Foods that contain natural (intrinsic) sugar e.g. onions (glucose, fructose) which they store during growth will caramelise. When sautéing (means frying them gently in oil for several minutes (the

structure of the onion softens and breaks down and the sugars are released. The heat changes the sugars in the onions and caramelises them, so that they turn a golden -brown colour and develop a characteristic flavour.

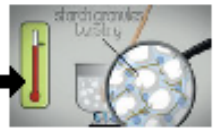
Gelatinisation—What happens:

Starch is found in small packets (granules).

Starch molecules are made of thousands of glucose molecules joined in **long straight** chains or **short chains with branches.** They sink to the bottom of cold liquids. If not stirred = lumps.

When **heated** to 60°C starch granules absorb water and swell up = the sauce starts to **thicken,** because there is less room for the starch granules to move around

At 80°C starch granules are very swollen and start to burst, letting starch out into the liquid.



At 100C the starch molecules form a 3D network that traps water stopping them moving around so much. At 100°C the liquid completely thickens – it has gelatinised.

As it cools the starch molecules form longer chains and the water molecules stay trapped so it becomes a solid gel.

Sauces must be stirred all the time to prevent starch granules sticking together at bottom of pan where they will swell up, stick together and make lumps

As the sauce cools down the starch molecules start to form longer chains and the water molecules stay trapped inside them so the sauce gradually becomes a **solid gel.**

If the sauce is not stirred, the starch granules will stay at the bottom of the pan whilst this is happening and will stick together and to the bottom of the pan, where some of them may burn. The sauce will have an unpleasant texture because the starch granules will have formed lumps as they swelled and they will not be distributed throughout the sauce.