Food Science Terms

Keywords and definitions:

Amino Acids: small molecules that form long chains in proteins

Blanching: briefly immerse (an item of food) in boiling water, especially as a technique for removing the skin from nuts or fruit or for preparing vegetables for further cooking

Denaturation: changing protein function by heat, acid, pH or mechanical action.

Foam Formation: the creation of a foam by whisking eggs and sugar together. E.g. when making meringues.

Gluten: a protein found in wheat flour

Hydrophobic: one end of an emulsifier - hates water – forms chemical bonds with oils

Hydrophillic: one end of an emulsifier – loves water and forms chemical bonds with it

Irreversible: the changes are permanent and cannot be changed back

Kneading: working a bread dough to develop the gluten and smooth out lumps

Melting Temperature: The temperature that something melts at. Relevant to fats as different fats have different melting temoeratures.

Modified Starch: Starches that have been modified to perform additional functions

pH: The scale used to determine how acid / alkaline something is. 0 is neutral, 1 is the most acidic and 14 is the most alkaline

Pre-Gelatinised: a starch that is used to thicken instant desserts without heat e.g. angel delight

Short: the term used to describe a crumbly texture in food. E.g. shortbread biscuits or shortcrust pastry. Fat is used to coat flour particles during the rubbing in method. This keeps gluten strands short and creates the crumbly texture

Viscosity: how thick or thin a liquid is.

Food Science and Carbohydrates:

Gelatinisation

- Occurs when starches (wheat flour, cornflour or arrowroot) thicken liquids. It also occurs during cooking with starchy foods such as rice, potatoes and pasta.
- Starch particles absorb liquid, swelling up. As the temperature rises, the starch particles burst (80˚C), thickening the liquid e.g. in a roux sauce.
- The process needs heat and stirring, especially in sauce making to prevent lumps forming.
- More starch gives a thicker sauce, ratios can be changed to change the viscosity of the sauce
- Modified starches are used in convenience foods such as gravy granules, quick cook pasta and pot noodles. Pre-gelatinised starch is an example.

Dextrinisation

- Occurs when starch is toasted or cooked by dry heat e.g. bread / cake
- The starch breaks down to dextrins. Dextrins taste sweeter than starch and add flavour to bread / baked goods
- Dextrinisation changes the colour (longer it is heated the darker it gets) and texture (becomes more crispy) – e.g. toast getting darker

Caramalisation

- Causes sugar to change colour and texture due to dry or moist heat.
- Causes baked goods such as cakes to go golden brown.
- Changes properties of sugar, it turns to syrup and tastes sweet and is glossy

Food Science and Proteins:

Protein Denaturation

- Denaturation occurs when the structure of amino acids is altered. They change shape or unfold because chemical binds are broken.
- Protein can be denatured by:

Heat	Proteins uncoil when cooked
pH	Reducing the pH (adding more acid such as vinegar / lemon juice in a marinade)
Enzymes	Helps tenderise meat causing denaturation
Mechanical Actions	Whisking e.g. foam formation with eggs

Protein Coagulation:

- Is a type of Denaturation
- It causes a change in texture for example, runny eggs become solid. Examples are quiche and egg custard.
- It starts as 60˚C and is completed by 70˚C – it is an irreversible process

Gluten Formation:

- When water is added to wheat to form a dough. String bread flour is used for bread as it contains more gluten.
- Gluten makes bread dough stretchy and elastic. Salt and kneading help strengthen the gluten. Gluten forms the structure of baked bread.
- Gluten in pasta helps it hold its shape as well as making the dough flexible.

Food Science and Fats / Oils:

Shortening

- Is the process that creates a “short” crumbly texture e.g. pastry
- The rubbing in method is used to coat flour particles in fat. This prevents long gluten stands from forming.
- The shorter the gluten strands are, the more crumbly a pastry is.

Pasticity:

- Means the ability of a fat to change properties over a range of temperatures. This is due to the combinations of chemicals called triglycerides.
- Different fats have different melting temperatures. Some products are created with lower melting e.g. Flora so it can be used straight from the fridge. Other fats such as lard will be solid in the fridge, but will soften as it gets warmer.

Aeration

- Helps a product have a light and open texture.
- Aeration increases the volume of a product by incorporating air through beating, whipping, creaming, and whisking.
- Fat and sugar beaten together trap air, this is called the creaming in method and often used in cake making.

Emulsification:

- Emulsions are mixtures of liquids that do not normally mix e.g. water and oil e.g. mayonnaise
- Emulsifiers have a hydrophobic and a hydrophilic end, meaning the water and oil can be combined together.
- Stabilisers keep emulsions mixed preventing them from spreading.
- Emulsification is the process of creating an emulsion.
- Egg yolks are a natural emulsifier as they contain lecithin.

Oxidation:

- Oxidation causes discolouration e.g. cut lettuce leaves turn pink / brown
- Oxidation causes vitamins to be lost, especially Vitamin C
- It enables enzyme activity
- Oxidation can be reduced during preparation and cooking of food by;
  - Use small amounts of water to boil vegetables
  - Use a quicker method of cooking e.g. steaming / stir fry
  - Serve vegetables immediately after cooking
  - Keep the lid on when boiling vegetables
  - Use the cooking water (this will contain lost water-soluble vitamins) to create other sauces e.g. gravy

Enzymic Browning:

- This occurs on the surface of cut fruits such as apples and on the surface of cut vegetables such as potatoes.
- It happens due to cell enzymes reacting with the air.
- Enzymic browning can be prevented by:
  - Blanching cut fruits or vegetables
  - Blanching vegetables before freezing
  - Dipping fruit or vegetables in acid (e.g. lemon juice)
  - Remove contact with air by submerging under water
  - Cooking as soon as vegetables are cut.