Name :-

Raising Agents

The 3 types of Raising Agent are

Key Words

1. physical raising methods
2. chemical raising agents
3. yeast is biological

Raising and Aerating

Physical Methods	Mechanical Methods
• Physical raising methods such as air, water vapour or steam help products to have a light, open texture. • Recipes that need to be light have ingredients that function as raising agents such as water, milk or egg whites.	• Food preparation methods such as sieving, whisking or beating can be used to trap air. • Combinations of physical and mechanical methods work well in food preparation to make mixtures light, e.g. batters for Yorkshire puddings.

1. Air, Steam and Foam as Raising Agents

- **Air** is a very effective raising agent because it expands when it is heated. Air pockets swell and volume increases.
- Food preparation techniques help prevent loss of air, e.g. folding in flour when making a whisked sponge cake.
- **Steam** is produced from water in a mixture; this is a physical change.
- Steam produces light, open and uneven textures and adds volume during cooking, e.g. profiteroles.
- Moist mixtures produce steam during cooking.
- **Foams** - whisking helps trap air, creating foam.
- Ingredients containing protein form foams, e.g. milk froth, egg whites.
- Egg whites stretch and unravel to trap air to form a gas-in-liquid foam.
- Sugar stabilises foam, e.g. cold-set soufflé.
- Egg white foams set mousses.
- Cooking stabilises foam, e.g. roulade, meringue.

Chemical Raising Agents

2. • Chemical raising agents produce carbon dioxide when heated with a liquid.
- They cause effervescent fizzing and bubbles of gas.
- Chemical raising agents must be carefully measured.

Bicarbonate of Soda

- Bicarbonate of soda is an alkaline powder.
- It can leave a soapy aftertaste but strong flavours, e.g. gingerbread, will mask the aftertaste.
- It works more effectively with an acid ingredient such as buttermilk or cream of tartar, e.g. soda bread.
- The acid neutralises the alkali and prevents soapy aftertaste.
- Cream of tartar is an acid raising agent, which is frequently used alongside bicarbonate of soda, e.g. in scones.

Baking Powder

- Baking powder is a ready-to-use mixture of cream of tartar plus bicarbonate of soda and rice flour.

Self Raising Flour

- Self raising flour is plain flour and baking powder added together to create rise. Plain flour alone does not contain a raising agent.
- Self-raising flour can be brown or white.
- Self-raising flour contains a pre-sieved precisely measured amount of baking powder for ease and speed of use.

Gingerbread

3. Biological Raising Agents

- Yeast is a biological raising agent. It ferments to give off carbon dioxide gas.
- Fermentation in yeast is a biological (also known as biotechnological) raising agent.
- The conditions for yeast fermentation are warm temperature 25°C–35°C; moisture; food; time.
- Temperatures above 60°C during baking will inactivate and finally destroy yeast cells.
- Boiling liquids will inactivate yeast, preventing fermentation from taking place.
- Yeast is the raising agent in bread, bread rolls, buns and rich pastries (Danish pastries).
- Leavened bread contains raising agent in the form of yeast or bicarbonate of soda.
- Unleavened bread contains no raising agent and is flat in structure.

Quick Test

1. What is the raising agent in a whisked sponge cake?
2. What happens when air is heated?
3. How does egg white trap air?
4. How can water help make a mixture light during cooking?

1.
2.
3.
4.

Raising Agents

1. Why is water an effective raising agent? Tick (✓) **one** answer.

   a) It turns to steam. ☐ b) It does not add calories. ☐

   c) It makes mixtures runny. ☐ d) It makes mixtures moist. ☐ [1]

2. Fill in the table by naming **two** chemical raising agents and giving an example of their use in food preparation.

Names of Chemical Raising Agent	Example of Use
______________ [1]	______________ [1]
______________ [1]	______________ [1]

3. Name the gas produced by chemical raising agents.

   ______________ [1]

4. This question is about the function of ingredients in choux pastry.

   a) When making choux paste, state **two** ingredients that help the pastry rise and puff.

   ______________ ______________ [2]

   b) Explain how these ingredients work during baking.

   ______________ [3]

   c) Why is it important to fully cook small choux buns, e.g. profiteroles?

   ______________ [3]

5. Tick (✓) the correct answer. Raising agents can be classified as:

   a) biological, microbial and physical. ☐ b) chemical, enzymic and biological. ☐

   c) physical, globular and pathogenic. ☐ d) chemical, physical and biological. ☐ [1]

> ***Learn this stuff — it's the yeast you can do...***
>
> Unlike chemical agents which add gas during baking, yeast adds gas to dough before baking. Yeast isn't used in cakes very often because cake mixtures struggle to hold air for the time it takes for fermentation to occur.
>
> Q1 Give two examples of mechanical raising agents. [2 marks]
>
> Q2 Explain why you would not use bicarbonate of soda to raise a plain sponge cake. [2 marks]

6 Describe **three** functions of raising agents in food preparation. [3]

1 ______________ 2 ______________ 3 ______________

A baker wants her shop assistants to understand raising agents. She uses examples from her shop.

Example 1

7 **Example 1 is a whisked sponge flan.**

a) What is the raising agent in the flan sponge? [1]

____

b) Describe how the raising agent is incorporated into the sponge. [1]

____

Example 2

Example 2 is a cheese scone.

c) Which raising agent is used in scones? [1]

____

d) What gas would the raising agent produce? [1]

____

e) Explain how the raising agent works during baking. [2]

____

Raising Agents

) What are the differences between bicarbonate of soda, baking powder and self-raising flour? [3]

) Name one biological raising agent and explain how it can be used to raise bread dough. [3]

) Explain how choux pastry profiteroles are risen by steam. [3]

) Describe six ways you could mechanically incorporate air into a cake mixture. [6]

Total Marks ______ 41

Food Nutrition and Health

Carbohydrate

You must be able to:

- Know and understand the functions, structures and main sources of carbohydrate
- Understand an individual's need for carbohydrate
- Demonstrate a knowledge and understanding of the consequences of consumption of excess carbohydrate and of deficiencies in carbohydrate.

Carbohydrate

- The body's cells require a constant supply of glucose, which is used as fuel to provide energy.
- Sugars and starches are types of carbohydrate.
- Dietary fibre is also a type of carbohydrate but it cannot be digested to provide energy.
- Carbohydrates are produced mainly by plants during the process of photosynthesis.
- Carbohydrates can be classified according to their structure: monosaccharides, disaccharides, polysaccharides.

Key Point

Carbohydrate provides the body with energy. Most of our energy should come from starchy foods.

Monosaccharides	Disaccharides	Polysaccharides
Monosaccharides are the simplest form of carbohydrate structure. They include: – Glucose – all other carbohydrate is converted into this in the body. – Galactose – found in the milk of mammals. – Fructose – found in fruit.	Disaccharides are more complex sugars that are formed when two monosaccharides join together. They include: – Sucrose – 1 unit of glucose + 1 unit of fructose. – Maltose – 2 units of glucose linked. – Lactose – 1 unit of glucose + 1 unit of galactose.	Polysaccharides are made up of many monosaccharides units joined together. They include: – Starch – many glucose units formed together. – Glycogen – formed after digestion. – Dietary fibre. – Dextrin – toasted crust on bread; sugars caramelise on the surface. – Cellulose – formed by plants from glucose. – Pectin – found in fruit, forms a gel on cooking.

Function and Sources of Carbohydrate

- Sugars are digested quickly in the body, providing instant energy.
- Starches have to be digested into sugars before absorption – this is slow energy release.
- Eating starchy foods rather than sugary foods is the healthier way to provide the body with energy. Starch (a polysaccharide) is found in bread, pasta, rice, breakfast cereals and potatoes.
- Sugars are found in a variety of sources including table sugar (sucrose), honey and jam, fruit juice, sweets and chocolate, fruit and vegetables.

Revise

Excess and Deficiencies of Carbohydrate

- Excess carbohydrate is converted to fat and is stored under the skin; this is the main cause of obesity.
- Excess sugar in the diet is linked to dental decay.
- There is evidence to suggest that the rise in Type 2 diabetes is linked to diets high in sugar.
- If insufficient carbohydrate is eaten, the body will firstly start to use protein and fat as an energy source.

Dietary Fibre

- The scientific name for fibre is Non-Starch Polysaccharide (NSP).
- Soluble NSP absorbs water, forming a gel-like substance. It can inhibit the absorption of cholesterol.
- Insoluble NSP is not absorbed by the body. It passes through the body as waste, which helps prevent bowel diseases.

Function and Sources of Dietary Fibre

- Dietary fibre makes food matter passing through the intestines soft and bulky.
- Dietary fibre can be found in wholemeal bread, wholegrain breakfast cereals (e.g. bran flakes, shredded wheat, porridge oats) wholemeal pasta and wholemeal flour; fruit and vegetables; potato skins; dried fruit, nuts and seeds, beans, peas and lentils.
- Adults should consume at least 18 g of fibre per day.
- Young children must gradually add high fibre foods to their diets.
- Fibre deficiency can lead to:
  - Constipation – this is when faeces become difficult to expel from the body because they are hard and small.
  - Diverticular disease – pouches form in the intestines, which become infected with bacteria.
- A low-fibre diet can be linked to cancer, particularly bowel cancer.

Quick Test

1. What is the function of carbohydrate in the body?
2. What happens if too much carbohydrate is eaten?
3. What does NSP stand for?

Key Words

dietary fibre
photosynthesis
monosaccharides
disaccharides
polysaccharides
Non-Starch Polysaccharide (NSP)
constipation
diverticular disease

Carbohydrate

1. What are the **three** carbohydrate groups?

.... [3]

2. Give an example of a monosaccharide.

.... [1]

3. Fill in the missing words.

Sugars are d .... very quickly in the body, providing instant e .... [2]

4. Most people in the UK do not eat enough dietary fibre. Suggest a similar food that is higher in dietary fibre to replace each of those listed below.

a) White bread ....

b) Cornflakes .... [3]

c) Mashed potato ....

5. Sugar, sweets and sugary drinks are associated with which type of decay in the body?

.... [1]

6. What would be the results of not eating enough carbohydrate?

.... [2]

7. Fill in the missing words.

St .... have to be digested into s .... before a .... – this is s .... e .... release. [5]

8. What is the name of the common medical condition frequently caused by a lack of dietary fibre (NSP) in the diet?

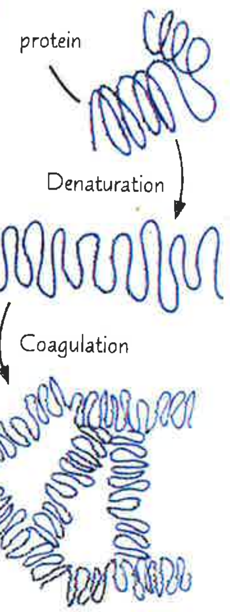
.... [1]

Total Marks .... / 18

Changing Properties — Proteins

I hope you like eggs, because they're a great way to look at the functional and chemical properties of proteins. Functional = how they change food, chemical = the science behind these changes. Let's get cracking...

Proteins Denature during Preparation and Cooking



1) Proteins (p.1) have a complex structure. When food is cooked, proteins denature — this means the chemical bonds holding their structure together break down.
2) The proteins unravel and their shape changes — in most cases this is irreversible.
3) Proteins can be denatured in different ways, including:
   - Physical agitation (e.g. whisking, beating and kneading)
   - Changes in temperature (e.g. heat)
   - Acids (e.g. lemon juice and marinades)

Acidic marinades denature the protein in meat before cooking — this makes the meat more tender before you start cooking it.

Denatured Protein Molecules Coagulate

1) Once they have been denatured, protein molecules collide with other protein molecules and coagulate (join together).
2) During this process, water becomes trapped between the protein molecules.
3) Coagulation also changes the appearance and texture of the food. E.g. egg white turns from a see-through liquid into a white solid, while steak becomes brown, firmer and easier to eat as you cook it.
4) However, if food is overcooked and coagulation happens too much, the protein tightens. This forces water out of the molecules, making it dry and chewy.

When eggs are added to breadcrumb coatings and quiche mixtures, the process of protein coagulation helps hold everything together.

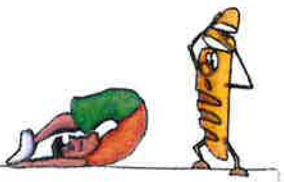
Foams are Formed when Air is Trapped

1) Foams, e.g. chocolate mousse, whipped cream or cappuccino foam, form when gas becomes trapped (aeration) inside liquid.
2) When liquids containing proteins are agitated (e.g. egg whites are whisked), the proteins inside the liquid denature — this causes them to stretch and air becomes trapped in the liquid.
3) When the proteins coagulate, this air becomes trapped, creating a foam.
4) However, over-whisking causes these new protein bonds to break — air escapes and the foam collapses.
5) Some foams form a solid structure when they are cooked, e.g. egg white foams become meringues.

Gluten allows Doughs to Stretch and Rise

1) Gluten is a protein found in wheat flours (e.g. those made from wheat, barley and rye).
2) It's formed when water is mixed with the flour to make dough and can be found in foods like bread, pasta, cakes and pastries.
3) Molecules of gluten are coiled — this means they are able to stretch and bend — this gives all doughs elasticity (stretchiness).
4) Doughs need to be kneaded to 'work' the gluten — this causes gluten strands to get longer, stronger and stretchier.
5) When it reaches a high temperature, gluten coagulates (see above) and the dough stays stretched. This gives foods like well-risen bread a light, airy texture.

To get a well-risen loaf of bread, it's best to use strong flour because it forms more gluten than other types (e.g. soft flour, which is used more often in cake making).



Indiana Foams and the Temple of the Whipped Egg White...

It might be ~~fun~~ helpful to draw a mind map of the ways proteins change during cooking — include changes to their chemical properties (e.g. molecules coagulate) and how this affects their functional ones (e.g. food becomes firmer).

Q1 Explain what happens to the protein in egg white when you fry an egg. [4 marks]

Changing Properties — Carbohydrates

For the exam you'll need to know about three ways in which carbohydrates change in food during cooking. If you need a quick refresher on carbohydrates before we get going, have a quick flick back to pages 5-6.

Starch Gelatinisation Thickens Liquids

1) Gelatinisation helps to thicken foods that contain starch, e.g. sauces, custards and gravies.
2) When starch granules are first mixed with liquid, they become suspended in it — if you don't stir the liquid these granules will sink to the bottom.
3) When the granules are heated with water, the bonds between starch molecules start to break, allowing water molecules to enter. As water is absorbed, the starch granules swell in size and soften.
4) Between 62 °C and 80 °C, the starch granules burst open and release their starch into the liquid.
5) This release of starch causes the liquid to thicken. How thick the liquid becomes depends on the ratio of starch to liquid in the mixture — the higher the concentration of starch, the thicker the liquid.
6) When it cools, the liquid solidifies and a solid gel is formed — this is useful for making 'set' desserts like custards and lemon pie filling.
7) Gelatinisation also happens when you cook starchy foods like pasta and rice — they swell, soften and release starch into the water as they cook.

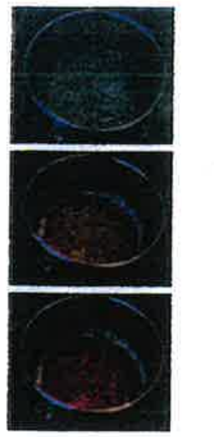
Custards can also be set using gelatine or by the process of protein coagulation (see previous page).

Dextrinisation occurs when Starch is Exposed to Dry Heat

1) When starchy foods such as bread or biscuits are cooked with dry heat, e.g. toasting or baking, the starch molecules in the food break down into smaller molecules called dextrins.
2) This breakdown is called dextrinisation and it gives food a browner colour and crispier texture as well as a different taste (imagine the difference in taste between bread and toast).
3) The longer the food is cooked, the more starch is converted into dextrin and the darker and crispier the food becomes.

Random fact: The psychological phenomenon of seeing things in everyday objects (toast, for example) is called pareidolia.

Sugar Caramelises When it's Heated



1) Sugar molecules break down when they reach a high temperature — this causes sugar to turn brown and change flavour. This process is called caramelisation.
2) The sugar goes through various stages:
   - At first the liquid is runny and has a very sweet taste.
   - As time passes, it becomes more like a smooth caramel.
   - Eventually, it turns harder and as it cools it becomes more like a candy.
3) Caramelised sugar can burn very quickly, turning black, brittle and bitter to taste.
4) To avoid this, water is often added during the early stages of heating.
5) Caramelisation gives desserts such as a crème brûlée and apple pie extra sweetness.
6) Even savoury foods that contain sugars (e.g. onions) can caramelise. The sugars in the food are broken down and released, turning the food brown and adding sweetness.

The sugar doesn't actually caramelise until the water has evaporated, but the water helps to increase the temperature of the sugar without it burning.

Tony Starch — saving the world one sauce at a time...

Blimey, there are some long words on this page! While it might be tempting to read over them quickly, it's important you can spell them correctly — especially gelatinisation, dextrinisation and caramelisation — lovely...

Q1 Explain why onions can develop a sweet taste when they are fried in oil or fat. [2 marks]

Q2 Describe what happens to starch granules when they are heated with water. [3 marks]

Name:

Due Date:

Changing Properties — Proteins

1 When liquids that contain proteins are agitated, air can become trapped and form a foam.

a) Which **one** of the following is an example of a foam?
Circle the correct answer.

A	Béchamel sauce	C	Whipped cream
B	Custard	D	Mayonnaise

[1 mark]

b) Explain why whisking a foam too much can cause it to collapse.

....

....

[2 marks]

2 Gluten is a protein that's formed when water is added to flour.

Explain **one** role of gluten in bread making.

....

....

[2 marks]

3 Jen is making a quiche. A[illegible]h step of the recipe she writes down some notes.

Explain the changes Jen has noticed for each of the following steps.

Recipe	Jen's Notes	Why have these changes occurred?
Step 5: Place the quiche in the centre of a pre-heated oven and bake for half an hour at Gas Mark 5 (190 °C).	"After half an hour, the quiche mixture started to set around the edges. I will keep it in the oven a little longer to firm up."	
Step 6: Remove the quiche from the oven when it has developed a golden colour.	"The quiche has developed a rubbery texture."	

[4 marks]

Score: ☐ / 9

Changing Properties — Carbohydrates

1 Bread turns brown and crispy when it is toasted.

What is the name of the process that causes these changes?

....

[1 mark]

2 Caramelisation is a process where sugars change during cooking.

a) Describe the changes that take place during caramelisation.

....

....

....

[2 marks]

b) What can happen if caramelised sugar is heated for too long?

....

....

[1 mark]

c) i) Give **one** sweet food that shows caramelisation.

....

[1 mark]

ii) Give **one** savoury food that shows caramelisation.

....

[1 mark]

3 A roux-based sauce is made using butter, plain flour and milk.

Psst... the key to gelatinisation is the starch in the flour.

Explain how gelatinisation occurs in a roux-based sauce.

....

....

....

....

....

[4 marks]

Score: ☐ / 10