

Examiners' Report  
June 2013

GCE Design and Technology  
Food Technology 6FT02 01

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## **Introduction**

This unit focuses on developing student's knowledge and understanding of the materials, components, additives and processes used in the design and production of food products. The emphasis is on the physical nature and working properties of the main food components as well as the stages in the preparation of food for large scale production. It also covers key areas of industrial food preparation including preservation and good manufacturing practice.

This paper effectively covered a broad section of the specification. It is evident that centres are teaching all areas well.

The responses to this paper indicate that centres have made good progress with the specification and it was pleasing to see many candidates demonstrating detailed and technical knowledge of the working properties of food components. The ramped nature of each question enabled all candidates to be able to access some of each question whilst providing opportunities for the most able to fully demonstrate their more technical knowledge. Many candidates wrote outstanding responses to the extended writing questions, gaining them maximum marks.

Less successful candidates frequently lost marks because their responses were not precise enough, either lacking the factual knowledge expected at this level, or often repeating the question.

Student's understanding of the command words remains a key feature and will be discussed in more depth as part of the analysis of each question.

It is worth noting here that centres should go through the interpretation of the command words as part of their preparation for the written examination. It is always disappointing to see candidates lose marks simply as a result of not understanding the question requirements. Centres should note that the amount of space provided in the booklet for answers is intended to be sufficient for all candidates to write a full and detailed response.

## Question 1 (a)

Question 1a focussed on size reduction and required three methods to be named. This is an example of a straight forward "name" question where one word answers are sufficient. Many candidates gained full marks. Those who named different types of milling equipment (e.g. hammer, ball) gained just one mark.

## Question 1 (b) (i)

Part b of this question focussed on the application of size reduction to the canning process and the mixing of dry ingredients.

The key word in b(i) was "uniformity". Some candidates misread the question and stated that foods needed to be reduced in size to "fit into the can". Others misinterpreted the question and gave answers which suggested the size of the food should be small to speed up the process. The question was looking for an understanding of the importance of **uniformity** for even heat penetration to prevent bacterial growth or to ensure even cooking of product.

(b) (i) Outline **one** reason why uniformity of food particle size is important in the canning process. (2)

Uniform food particle size is important in canning to ensure that there is a uniform heat penetration. Uniform heat penetration is important as all particles - it find need to be brought to the correct temperature, for this ensures that all bacteria is destroyed.



### ResultsPlus Examiner Comments

A detailed response which links the uniformity of particle size to the prevention of bacterial growth.



### ResultsPlus Examiner Tip

Underline key words on the question.

## Question 1 (b) (ii)

Responses to this part showed more recognition of the word "uniformity" and many candidates were able to explain the impact of size on the success of the mixing process. The need for premixing and the prevention of demixing were relevant to this question and many responses explained this well.

(ii) Outline **one** reason why uniformity of food particle size is important when mixing powdered ingredients.

(2)

To prevent demixing - smaller food particles will sink to the bottom producing an uneven mix if food particle size is not uniform.



### ResultsPlus Examiner Comments

Preventing demixing is the reason given here. The effect of demixing is then explained for two marks.



### ResultsPlus Examiner Tip

The number of marks made it clear that this question required an explanation as well as a reason.

(ii) Outline **one** reason why uniformity of food particle size is important when mixing powdered ingredients.

(2)

It is important with powdered ingredients as if particles are not uniform it could result in demixing of the product. This does not look appealing in a packet. When a product demixes all the large <sup>particles</sup> ~~materials~~ rise to the surface. This leaves dusty powdery ~~material~~ particles at the bottom.



### ResultsPlus Examiner Comments

An excellent answer which explains that demixing would not meet consumer requirements.

## Question 1 (c)

The command word "describe" requires a response in which facts are developed. For the maximum four marks, candidates needed to give two, fully explained reasons. A range of responses were seen in this question. More able candidates showed excellent knowledge of this process and used appropriate technical vocabulary such as "immiscible". The role of the emulsifier in creating a dispersion of oil and water was less well described. Some did not read this question carefully and lost marks because they described how an emulsifier works, rather than its effect on the mixing of liquids.

(c) Describe **two** reasons why the use of emulsifiers may be necessary when mixing liquids.

(4)

To combine two immiscible liquids, such as oil and water, so they are evenly dispersed in each other.

To prevent separation so they do not separate out into layers as this would be unightly and unpalatable.

(Total for Question 1 = 11 marks)



**ResultsPlus**  
Examiner Comments

Candidate demonstrates high level knowledge of this topic. Technical terms are used with accuracy and the impact of separation on sensory qualities is also recognised.

## Question 2 (a)

It is clear this topic has been well taught by centres and many gained maximum marks for this question. As the mark scheme shows, there are a number of stages to the HACCP plan and this enabled most students to be able to recall five. It was not essential to write this in the correct order. Some candidates misinterpreted the question and, instead of identifying the stages of HACCP, gave examples of how it should be implemented within a factory. As a result they gained no marks

2 (a) Identify any **five** stages of a HACCP plan.

(5)

- 1 Analysis of process, when the hazard of product are identified.
- 2 Critical control points are recognized, when solutions are starting to be made.
- 3 Develop a monitoring system, when its thought of how checks will be made.
- 4 Verification, this involves checking that ingredients are safe to use, correct temperature.
- 5 Documentation, when documented evidence is provided, such as; HACCP, risk assessments, loading.



**ResultsPlus**  
Examiner Comments

An excellent answer - five stages of HACCP accurately identified. Candidate demonstrates depth of knowledge and understanding in this response.

## Question 2 (b) (i)

Traceability is clearly understood and its importance within quality assurance was explained well by most. Many responses included reference to the use of bar coding within traceability and its role in consumer confidence. Weaker candidates gave vague responses such as "to trace back if there is something wrong with it". This could be improved by the use of terminology such as "fit for purpose". A frequent incorrect response stated that traceability was linked to the topic of food allergies.

(b) (i) Outline the importance of traceability as part of a quality assurance system in the food industry.

(2)

Traceability allows a food product to be traced to the source of where + when it was produced in the case of (for example) a food poisoning outbreak. A beef burger would be traced back to a particular herd of cows + so that meat would ~~to~~ be removed from the market.



### ResultsPlus Examiner Comments

The importance of traceability is explained well with reference made to identifying the source of ingredients and when this might be necessary (food poisoning).



### ResultsPlus Examiner Tip

The use of a specific example (in this case beefburgers) may help some students clarify their explanation.

(b) (i) Outline the importance of traceability as part of a quality assurance system in the food industry.

(2)

~~the process~~ If something goes wrong / consumer is not satisfied, if there are records kept for all of the sources of supply and procedures, the source of the hazard can be traced and detected - proof of due diligence by manufacturer



### ResultsPlus Examiner Comments

A good explanation of how record keeping demonstrates due diligence.



## Question 2 (b) (ii)

Section 2.5 of the specification looks at "good manufacturing practice" and includes a knowledge of Food Safety Acts. This question focussed on how the Food Safety Act is enforced. Many lost marks by calling the officials who enforce the Act "food inspectors" rather than "environmental health officers". It was important that candidate's explanation made it clear that inspections are "random" and not "regular" as many stated. Most gained one mark for giving one or more of the consequences of failing to conform to the Act .

(ii) Describe how The Food Safety Act 1990 is enforced in the food industry.

(2)

It is enforced by environmental health officers and trading standards officers who have power to inspect food and issue improvement notice a emergency closure. Not complying can result in fine or imprisonment

(Total for Question 2 = 9 marks)



**ResultsPlus**  
Examiner Comments

Candidate is able to name the two officials involved as well as outline their powers. Maximum marks for this response.

### Question 3 (a)

Understanding underlying microbiological principles was the focus of this question. Knowledge of the bacterial lifecycle was pleasing with many gaining maximum marks in this part.

3 (a) Outline **two** of the four stages in the bacterial life cycle.

(4)

1 LOG → This is when bacteria start to multiply rapidly every 10-20 minutes, this is known as binary fission.

2 DECLINE/DEATH → This is when bacteria start to die because they've used up all of the nutrients that they need from the food.



**ResultsPlus**

**Examiner Comments**

An example of the high level, technical knowledge and clear explanation given by many candidates.

### Question 3 (b) (i)

Some responses to this part were lacking in the depth of knowledge required at this level. Where pupils referred only to vague temperature ranges such as "heat" "warmth" and "cold", no marks were gained. Candidates are expected to know the specific temperatures for the danger zone, for example. Many demonstrated excellent detailed knowledge, including explanations of the temperature ranges for specific bacteria such as mesophiles.

(b) Describe how the following **three** factors may influence the growth of bacteria:

(i) temperature

(2)

The peak temperature for high bacteria growth is between 20°C and 40°C whereas growth is prevented in low temperatures (-18°C)



**ResultsPlus**

**Examiner Comments**

The effect of temperature on bacterial growth is clearly explained with reference to both the optimum growth range (20-40 degrees C) and the temperature at which bacteria are dormant (-18 degrees C).

(b) Describe how the following **three** factors may influence the growth of bacteria:

(i) temperature

(2)

If the temperature is right, bacteria multiply rapidly as it has the correct condition. If it is too high it will be ~~killed~~ killed and if it is too low it will be retarded.



**ResultsPlus**  
Examiner Comments

Whilst it is clear the candidate understands how a change in temperature will affect the growth of bacteria, this is not specific enough at this level to gain any marks.

### Question 3 (b) (ii)

Candidates need to ensure they do not simply repeat the question as no marks can be gained for this. It is also important that the stem of the question is carefully read as some referred to the growth of moulds and not bacteria. It was pleasing to see responses which discussed the effect of drying on bacterial growth and some explained how the presence of salt or sugar would make the water unavailable.

(ii) moisture (Aw 1) - water (Aw-0.71) ...  
(Aw 0.6) - Dried (Aw-0.96) (2)

bacteria needs a water availability of 0.91 therefore drying food is a good preservation method. as there isn't enough water available for them to ~~survive~~ survive.



**ResultsPlus**  
Examiner Comments

An accurate description which explains why drying preserves food as well as discussing the optimum water availability for bacterial growth.

### Question 3 (b) (iii)

This question was very well answered. Most stated the pH number for neutral and many went on to explain the effect of acidic or alkaline conditions on bacterial growth.

(2)

Bacteria Cannot Survive in acidic conditions below 3.5 pH.  
They prefer neutral conditions of 7 pH.

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(Total for Question 3 = 10 marks)



**ResultsPlus**  
Examiner Comments

The effect of acidity is explained and the pH for neutral conditions is given.

### Question 4 (a)

A straightforward recall of knowledge question from 2.3 – carbohydrates - which asked for names of simple and complex **polysaccharides**. Some candidates lost marks because they named monosaccharides or disaccharides. Another common error was naming the two types of starch (amylose and amylopectin) as simple polysaccharides. The majority of responses were correct and many gained full marks.

4 (a) Complete the following table by providing **two** examples for each named carbohydrate. (4)

Carbohydrate	Example
Simple Polysaccharides	1 Starch
	2 Cellulose
Complex polysaccharides	1 Pectin
	2 Gums



**ResultsPlus**  
Examiner Comments

An example of an accurate response.

## Question 4 (b)

The process of gelatinisation has been taught in depth and this "describe" question gave candidates the opportunity to demonstrate detailed knowledge. Relevant temperatures were often known and more able students explained the importance of hydrogen bonding in the process. It should be noted that, even some candidates who knew the process in detail, forgot to make it clear that both water and heat are essential in gelatinisation. Others moved away from the question and discussed retrogradation.

(b) Describe the process of gelatinisation of starch.

(6)

The starch granules must be in a suspension (liquid).  
A ~~to~~ The mixture must be heated. At 60°C the starch granules begin to swell to 5 times their original size. At 80°C the starch granules begin to split. The starch is released from the mixture. By 100°C the starch granules have fully burst. The sauce ~~is~~ slightly thickens, however on cooling a gel is formed. ~~Seta~~ water bridges are formed within the ~~g~~ suspension, which if broken down, this causes retrogradation and syneresis of the water as it leaks from the product. Adding salt to the process of gelatinisation ~~stops and~~ retards the process, so it should be added after.

(Total for Question 4 = 10 marks)



**ResultsPlus**

Examiner Comments

This candidate gained full marks for a detailed description of gelatinisation. The key features (water and heat) are identified and the candidate demonstrates accurate, technical knowledge of the process.



**ResultsPlus**

Examiner Tip

Writing a plan for a six mark question might assist candidates by ensuring they include all stages in a logical order.

### Question 5 (a)

Any two characteristics of an unsaturated fatty acid were acceptable and this question was well answered by most. Popular answers included its physical nature such as "soft" and "liquid at room temp". The question allowed candidates to also refer to the health benefits or describe its ability to pick up hydrogen or oxygen because of containing one or more double bonds. The main incorrect response was that these fats are susceptible to rancidity – whilst being correct, this does not answer the question.

5 (a) Give **two** characteristics of an unsaturated fatty acid. (2)

1. Contain at least one double bond

2. Liquid oil at room temperature



**ResultsPlus**  
Examiner Comments

Two acceptable answers rewarded with full marks

### Question 5 (b)

Following on from 5a, this part of the question enables students to show their knowledge of hydrogenation. Many detailed, technically accurate answers gained maximum marks. All aspects of the process were described well .

(b) Describe the process of the hydrogenation of oils. (4)

Hydrogenation is the hardening of liquid oils into solid fats. It involves heating the oil with a small amount of the catalyst nickel. It is a process where double bonds are removed and hydrogen is added across the double bonds effectively making it more saturated.



**ResultsPlus**  
Examiner Comments

A concise, technically accurate response which shows detailed knowledge of the process, in a logical order and which is rewarded with full marks.

## Question 5 (c)

The last part of this ramped style question continued to focus on Fats. Responses indicate that rancidity is clearly understood and has been taught well. It was pleasing to see very detailed responses in which the two types of rancidity were often explained in great depth. Some candidates incorrectly stated that hydrolytic rancidity occurred in the presence of hydrogen rather than water. A few recognised where rancidity is a desirable occurrence i.e. in cheese making and where it is not.

(c) Discuss how fats become rancid.

(6)

Fats <sup>can</sup> become rancid by hydrolytic rancidity. Hydrolytic rancidity needs water to be present in the fat and it effects products like butter. This type of rancidity cannot be reversed, only retarded by storing fats in cool conditions. Rancidity in products produces unpleasant smells and flavours. Oxidative rancidity is most common and occurs in meat. It produces free radicals which are ~~know~~ thought to be cancer causing. There are three different stages of the free radicals. Propagation, Termination, Growth. The free radicals react with the oxygen and destroy the ~~me~~ product. Rancidity can be slowed down by using antioxidants like vitamin C.

(Total for Question 5 = 12 marks)

Hydrolytic Rancidity — Needs water — Butter  
Oxidative Rancidity — most common — Free radicals



### ResultsPlus Examiner Comments

This is a good example of a response which gained maximum marks. It explains both types of rancidity, how each type occurs as well as examples of where they occur.



### ResultsPlus Examiner Tip

Remind pupils to think about the question. Here candidates were asked to discuss "how fats become rancid", NOT how rancidity can be prevented. A simple plan as illustrated here, can assist candidates when writing their response.



(c) Discuss how fats become rancid.

(6)

There are two types of rancidity, oxidative, which is when ~~there~~ <sup>fat</sup> has been exposed to oxygen, ~~oxygen~~ <sup>no</sup> present, another is hydrolytic rancidity where there is water present. Both these types of rancidity happen over a long period of time. When fats are rancid they have a strong smell.

(Total for Question 5 = 12 marks)



**ResultsPlus**

**Examiner Comments**

This candidate has been able to identify and explain the two types of rancidity. Marks are also gained for knowing that rancidity happens over time and that it results in an intense odour.

## Question 6 (a)

Preservation is a key topic and the first part of this question simply required students to name two methods which involved the use of heat. Pasteurisation and sterilisation were the most popular answers. A significant numbers of candidates incorrectly gave blanching as a method of preservation.

6 (a) Name **two** methods of preservation by heat. (2)

1 pasteurisation - short heat treatment

2 sterilisation - high temperatures for a long time



### ResultsPlus Examiner Comments

This question only required candidates to **name** two methods of preservation that uses heat. One word answers are therefore acceptable.



### ResultsPlus Examiner Tip

Understanding the meaning of command words in questions will help candidates to give the appropriate response.

## Question 6 (b)

Many candidates either failed to read the question correctly, or did not know the process of accelerated freeze drying, many referring to it as a method of freezing food. Whilst the question did not ask for a description of the process, candidates were not able to accurately discuss the effects of AFD if they believed this was a method of freezing. Many students incorrectly discussed the formation of ice crystals and their effect on the quality of food products. There were also many who discussed this topic with accuracy, providing technical detail in describing the many positive effects of AFD. It was clear that some who were unsure of the process were able to offer a well thought out response such as "extends shelf life".

\*(b) Describe the effects of Accelerated Freeze Drying (AFD) on food products.

(6)

Product is frozen then subjected to strong vacuum and small amount of heat. It is an expensive method so used on high quality products and dried foods. It leaves the product very porous with holes where the ice crystals were. It is a very quick process so there is no case hardening (accumulation of sugars and salts at surface creating a skin) and there is little shrinkage and easy rehydration. However it may affect the flavour and nutrients ~~and~~ as there will be a loss in water soluble vitamins. The texture and mouthfeel of the product may also be affected.



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**Examiner Comments**

The middle part of this response accurately applies detailed technical knowledge of case hardening to AFD and identifies two positive effects of the process ( little shrinkage and easy rehydration). The remainder of the response is inaccurate as this process has little effect on flavour, nutritional content or texture.

\*(b) Describe the effects of Accelerated Freeze Drying (AFD) on food products.

(6)

Accelerated freeze drying starts off with the product in a freezer. A small amount of heat is added by conduction, radiation or microwaves. This enables the ice to change straight to water vapor. The effects of accelerated freeze drying is that there are little or no change to the appearance or quality of the product. It is cheaper and more effective. The product still contains the same nutritional value and there is little shrinkage of the food during this rapid dehydration process. This process is also cheaper as it is quick and efficient.

(Total for Question 6 = 8 marks)



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**Examiner Comments**

The candidate begins by describing the process of AFD which, though accurate, does not answer the question. Reference to cost and being effective also gain no marks as they do not describe the effects on food products. Within this there are correct statements regarding little or no change to appearance, quality and nutritional content.



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**Examiner Tip**

Encourage pupils to highlight key facts in their responses during revision. This may prevent them repeating themselves (e.g. "cheaper").

## Question 7 (a)

This question continues to look at section 2.4 "Industrial and commercial practice" and this part focuses on the evaluation of glass as a packaging material. Because the question begins with the word "evaluate" candidates are expected to consider the advantages and disadvantages of the material. Full marks were therefore only given when at least one advantage and one disadvantage were included in the four responses. This was a well answered question and many gave more than the four required responses. Common misconceptions were that glass is expensive to produce, that it can be easily sealed without any additional packaging and that it is unable to withstand high temperatures.

7 (a) Evaluate the use of glass as a packaging material for food products.

(4)

glass is a good material for packaging as it is transparent and so its contents is clearly visible, it is relatively cheap to produce, it is environmentally friendly as it can be recycled. However it is ~~heavy~~ relatively heavy and easily breakable which means that it would be difficult to transport.



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**Examiner Comments**

A very typical response which evaluates glass as a packaging material well. Both advantages and disadvantages are identified and full marks awarded.

## Question 7 (b)

The quality of the written response was examined in this discussion question and candidates should be advised not to respond with a list or with one word answers in asterisked questions. This is another question where many students used two lines in the response section to repeat the question.

The computer control of process is also part of section 2.4. This question asked candidates to discuss how CAM is used **effectively**. It was not therefore appropriate to include its limitations or disadvantages. A large number of responses were both detailed and well written with all aspects of CAM being considered. Knowledge of its application and its benefits to the manufacturer and the consumer were often discussed. A few candidates lost marks through confusing CAM with CAD.

\*(b) Discuss how computer aided manufacture (CAM) is used effectively in the food industry. (6)

Computer aided manufacture (CAM) is useful in the food industry ~~is~~ because it helps with the quality and production of the food product, CAM is where data is put into computers and then the computer tells machinery what to do. This means that food products will ~~is~~ all get the same information on how and what needs to happen at ~~that~~ that stage of <sup>the</sup> production process. Therefore, machinery will carry out the same tasks on every food product so quality of the food products will be the same. CAM is also effective because it will increase the scale of production as more goods can be produced due to quickness and efficiency of machines. CAM also means that ~~there~~ <sup>there</sup> is little wastage as possible which saves money/profits and not as many workers are needed so less costs.

(Total for Question 7 = 10 marks)

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**TOTAL FOR PAPER = 70 MARKS**



### ResultsPlus Examiner Comments

An example of a response where most of the marks are gained in the last few sentences. At the beginning this candidate wastes many lines describing CAM and referring in vague terms to its benefits. More specific points which gain marks are all given at the end.



### ResultsPlus Examiner Tip

Encourage students to write a plan. Identifying six facts and explaining each one would result in maximum marks.

\*(b) Discuss how computer aided manufacture (CAM) is used effectively in the food industry.

(6)

Computers are effectively used in the food industry to create uniformity, so all the cookers are set to the correct cooking times and rollers for example can be selected to the correct tolerance. This makes all foods look exactly the same, which means the same specification points. Computers are also used to create efficiency, where they can be linked to food orders, so if it is low then the food product can be replaced. It also makes it easier for specification and analysis points to be changed. The advantages is that it is quick as machines can produce bulk products unlike by hand, employees don't need to work, which reduces risk of contamination. However some machines can be very expensive to buy and run.

(Total for Question 7 = 10 marks)

TOTAL FOR PAPER = 70 MARKS



**ResultsPlus**

**Examiner Comments**

The effectiveness of CAM is discussed throughout this response. Points such as "increasing efficiency" are developed with an example. This candidate demonstrates good knowledge and the ability to support facts with explanations. This is vital in questions that ask for a discussion.

The final comment is an example of an irrelevant response as it does not illustrate the "effectiveness" of CAM.



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**Examiner Tip**

Do not waste the space available repeating the question. Writing a plan may assist candidates to ensure all their response answers the question set.

## Paper Summary

It is evident that centres are now very familiar with the expectations of the specification for GCE Food Technology at AS level. There were very few blank responses to any of the questions, suggesting all candidates were prepared well for the demands of this AS exam paper.

Based on their performance on this paper, candidates are offered the following advice:

- Identify key words in the question to ensure their response is appropriate.
- Know the meaning of the command words used.
- Spend time planning longer responses. This thinking time is likely to assist candidates to structure their response and enable them to stay focussed.
- Use technical vocabulary wherever possible.
- Use specific data where this is required e.g. temperatures for bacterial growth.
- Continue to link knowledge for 6FT02 to the work carried out for 6FT01 – Portfolio of Creative skills e.g. HACCP.



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