Paper 2 Section B
Food Science and Technology
Extended Study
when mixed with liquid and heated, the starch granules in cornflour begin to swell (1). The swollen granules break up and release long chain amylose and amylopectin, and turn the mixture viscous to form the pudding (1).

### Satisfactory
Candidates in general were able to describe the **change of cornflour** in the process of **gelatinisation**. However, only some of them were able to explain the science behind the change.
(b) - ginger juice contains a protease enzyme (zingibain) that catalyses the denaturation of the milk proteins (1).
- to form the milk custard / turn the milk protein from a soluble form to an insoluble one (1).

Fair. Candidates generally showed an understanding that the formation of the curd was due to the denaturation and coagulation of the milk protein. However, quite a number of these candidates did not realise that it was the enzyme in ginger juice that catalysed the denaturation of the milk protein.

"Ginger juice contains enzymes which can coagulate the protein in milk. When making ginger milk custard, the ginger juice is added into the milk. With the addition of ginger juice, the custard can set due to the coagulation of milk protein."

"Flavours added by using ginger juice to make ginger milk custard. Ginger milk a strong flavour as well as small that when the ginger juice added into the milk custard. It becomes ginger flavoured."

"薑汁在加熱後與牛奶同時進行凝結中，薑汁中之酶因而轉移到牛奶之中，在熱力下牛奶凝結成凝塊狀，形成薑汁凝塊。"
9. (a) Any two of the following:
- to **inactivate** the enzymes so as to maintain the food quality (1)
- to reduce / **kill** microorganisms (1)
- to **retain** the colour of the peas (1)
- to remove the unfavourable **flavour** of peas (1)

(b) - to prevent the cheese chips from going **rancid** (1)
- to prevent the cheese chips from breaking into pieces (1)

9. (a) Fair. Most candidates correctly stated the **sterilisation** function of blanching. However, not many candidates realised that blanching could **inactivate the enzymes and retain the colour** of the green peas.

(b) Fair. Many candidates knew that flushing the containers with nitrogen gas helps **preserve** the chips. However, not many of them went on to explain that this **modified atmosphere packaging** would retard oxidative rancidity.
(c) - to prevent the potatoes from sprouting (1)
- to extend the shelf life of the potatoes (1)

Satisfactory. Candidates in general were able to explain the purposes of irradiating the potatoes before packing.

Irradiating the potatoes before packing can prevent the sprouting of potatoes, so the sprouting of potatoes will not occur and they can be kept for a longer time.
10.(a) (i) Any one of the following:
- the packing material (e.g. plastic bag) has been mixed into food ingredients when they are received (1)
- hair/nail from food handlers in sandwich making / packaging (1)

(ii) Any one of the following:
- residual pesticides in vegetable ingredients when they are received (1)
- chemical residues (e.g. detergent, bleach) in containers containing the ingredients during their storage (1)
(iii) Any one of the following:

- **pests** in the shop may contaminate the food ingredients during their storage / pests in the shop contaminate the sandwich during sandwich making or during packaging and sale (1)
- **microbial** contamination caused by **poor handling practices** during sandwich making / packaging (1)
(b) - packaged sandwich should be stored at 4°C (1)
- packaged sandwiches should be discarded if they have been kept at 4°C for 24 hours / at room temperature for 4 hours (1)

(b) Poor. Only a small number of candidates were able to give two critical control points for the ‘packaging and sale’ process. Many candidates failed to state the critical limits regarding temperature and storage time in monitoring and controlling the potential hazards.
- by keeping the list of suppliers and transaction record of ingredients properly (1)
- these records can be tracked in case of incidents (1)

(c) Fair. Candidates generally showed an awareness of the importance of establishing record-keeping and documentation procedures in the system. However, their answers were vague and they were unable to give examples for food traceability practices (e.g. keeping a list of the suppliers and documents showing food transactions).
11. (a) (i) - it is a stabiliser (1)  
- to increase the viscosity of the mayonnaise without substantially modifying its other properties / to provide body, increase stability, and improve suspending action (1)

(ii) - it reduces the chance of the mayonnaise going rancid / it acts as an anti-oxidant (1)  
- to extend the shelf life (1)

Fair. Although the majority of candidates were able to describe the general functions of xanthan gum, few of them stated its specific use in this food product.

Fair. Many candidates knew that vitamin E is an antioxidant. However, only some of them knew that vitamin E also helps extend shelf life.
Mayonnaise is not a highly perishable food (1) which would constitute an immediate danger to human health from the microbiological point of view after a short period beyond the expiry date (1), thus it should indicate ‘Best before’ instead of ‘Used by’ in its expiry date.

Fair. Candidates generally showed an understanding of what types of food could use ‘Best before’ for expiry date. However, some candidates mistakenly thought that mayonnaise is a highly perishable food.
(c) (i) Polyethylene terephthalate / PET/聚对苯二甲酸乙二脂

(ii) The boiling water will soften the plastic and cause the bottle to deform / change shape

Very poor. Few candidates correctly identified the type of plastic used.

Good. Although only a small number of candidates correctly stated the plastic used in (i), most candidates were able to make use of their understanding of the general properties of plastics to suggest a sensible explanation.
Candidates in general demonstrated only basic knowledge and understanding of the actions of the microorganisms in the production of soya sauce and rice vinegar and the production procedures involved. Many candidates gave only a brief description of the fermentation processes. They were unable to identify the types and uses of microorganisms in different production processes. They also failed to state the key production procedures systematically. However, most candidates were able to illustrate how the sensory qualities of the fermented products could be used in food preparation using suitable examples.

<table>
<thead>
<tr>
<th>Actions of the microorganisms and the production procedures</th>
<th>Sensory qualities and uses in food preparation</th>
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<tbody>
<tr>
<td><strong>Soya sauce</strong></td>
<td>Any two of the following:</td>
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<tr>
<td>- <strong>Making soya koji</strong></td>
<td>- <strong>sour</strong>: used as a condiment in e.g. sweet and sour pork</td>
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<tr>
<td>- Starter mould (<em>Aspergillus oryzae</em> and <em>Aspergillus soya</em>) is inoculated to cooked soya beans and roasted wheat to provide proteases and amylase to digest the proteins and starch in soya beans into amino acids and simple sugars</td>
<td>- <strong>high acidity</strong>: used as a pickling agent for gherkins</td>
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<tr>
<td>- <strong>Mixing soya koji with cold brine</strong></td>
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<tr>
<td>- Brine is added to koji to kill the starter mould, inhibit the growth of undesirable microbes, and to provide a suitable chemical environment for the subsequent fermentation process</td>
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<tr>
<td>- <strong>Fermentation in brine</strong></td>
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<td>- Soya koji in brine is inoculated with salt-tolerant lactic acid bacteria and yeast</td>
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<tr>
<td>- These microbes hydrolyse the partially digested soya beans to amino acids, fatty acids and simple sugars</td>
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<tr>
<td><strong>Rice vinegar</strong></td>
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<tr>
<td>- <strong>Converting starch to fermentable sugars (i.e. saccharification)</strong></td>
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<tr>
<td>- Mould (<em>Aspergillus oryzae</em> and <em>Aspergillus soya</em>) grow on cooked rice and provide amylase to digest the starch in rice to simple sugars</td>
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<td>- <strong>Alcoholic fermentation</strong></td>
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<td>- The sugars obtained will be fermented using yeasts under anaerobic condition to give ethanol</td>
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<td>- <strong>Acetogenic fermentation</strong></td>
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<tr>
<td>- Acetic acid bacteria (<em>Acetobacter</em> and <em>Glucocobacter</em>) is used to oxidise the ethanol obtained to acetaldehyde and then to acetic acid (i.e. vinegar)</td>
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</tr>
</tbody>
</table>
What is the function of mould here?

How about the use of brine?
Microorganisms are included in the production of soya sauce and rice vinegar and we can produce them with fermentation.

First, Mould fermentation is used to make soya sauce. Soy beans, flavourings, additives and water are mixed to form a mixture. Then the mixture will be fermented using the help of mould, which is a kind of microorganisms. After fermentation, soya sauce will be produced.

Second, Acetic acid fermentation is used to make rice vinegar. The ingredients of making rice vinegar such as rice will be mixed with acetic acid bacteria for fermentation. During the fermentation, ethanol will be changed into vinegar. And rice vinegar will be produced.

Soya sauce and rice vinegar can be applied in food preparation.

For soya sauce, it contains a special flavour which can make the dish more tasty and add a slightly salty flavour to the dish. For example, when making a dipping sauce for shrimp or fish, soya sauce is the main component of the dipping sauce. Soya sauce can also be used to marinate meat so that the meat would have a stronger flavour and become more delicious.

For rice vinegar, its flavour is acidic and a small amount of rice vinegar can be added to various dishes to add the acidity of the dish and enhance the flavour of the dish. For example, if we stir-fry meat with vegetables, rice vinegar can be added to enhance the flavour of the dish and it provides a fresh taste. The dish will become slightly sour and stimulate the appetite. Rice vinegar can be used to marinate meat too.

In conclusion, soya sauce and rice vinegar are widely accepted and used in a variety of dishes to enhance the flavour of the dishes since they have special sensory qualities.
Both soya sauce and rice vinegar are fermented products. For soya sauce, soya sauce is made by soya bean when not started, to making soya sauce. We need to put the soya bean into a large amount of water to make the soya bean soft and then put the soft soya beans into a special jar and control the moisture and the temperature of the soya bean. After fermentation for some bacteria for a period of time, then the soya bean inside the jar changed the colour, texture, smell and also taste to a soya sauce. For the rice vinegar, it is similar in the production procedures involved in the soya sauce. We put white rice into a jar and started to wait for the fermentation of the rice.

For the sensory qualities of the fermented products, we need to take care of the quality of the foods so that no bad quality of the ingredients will mixed up. Also, when started to produce the fermentation food, the moisture, the temperature are very important to make those success. Once there are something wrong with the process, the fermentation will fail and the half-fermented food have been perish and contaminate.

Not relevant to the action of microorganisms

Misunderstand the term “sensory quality”

Low
Some observations:

• Students do not fully understand the inter-relationship of different scientific concepts
e.g. function of a specific agent – changes of the reaction involved – final result

• Students are weak in applying the scientific concepts in food preparation process
Suggestions:

• Try to develop concept map, flow chart and comparison table with students to enhance understanding of concepts
Some interesting reading regarding food science or perform some simple experiments in class.

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