

2913/204
FOOD PROCESSING AND
PRESERVATION I
June/July 2020
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN FOOD SCIENCE AND PROCESSING TECHNOLOGY
MODULE II

FOOD PROCESSING AND PRESERVATION I

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

answer booklet;

non-programmable scientific calculator.

This paper consists of TWO sections; A and B.

Answer ALL the questions in section A and any TWO questions from section B in the answer booklet provided.

Each question in section A carries 15 marks while each question in section B carries 20 marks.

Maximum marks for each part of a question are as shown.

Candidates should answer the questions in English.

This paper consists of 4 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

SECTION A (60 marks)

Answer ALL questions in this section.

Food processing - this is the conversion of raw animal & plant material to healthy, nutritive and safe food.
Food preservation - techniques employed to help food sustain its desirable characteristics up to the longest time possible of being

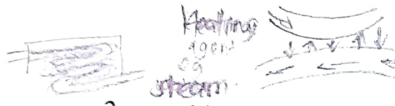
1. (a) Differentiate between food processing and food preservation. (4 marks)

- (b) State three benefits of food preservation. (3 marks)
- 1. Helps reduce wastes of excess food.
 - 2. Increases shelf-life of goods eg vacuum packaging.
 - 3. Saves on money & travel to other countries.

- (c) Explain four factors which cause fluctuation in low temperature storage. (8 marks)

- (a) State five preservative effects of smoking. (5 marks)
- 1. Kills microbes
 - 2. Antimicrobial effect
 - 3. Phenol compounds that prevent oxidative rancidity
 - 4. Lower pH making it unfavourable for microbial growth
 - 5. Reduces moisture content

- (b) With the aid of a labelled diagram, explain the principles of counter-current drying. (10 marks)



- (a) State five extrinsic factors which influence food spoilage. (5 marks)
- 1. Temp
 - 2. Humidity
 - 3. Gases - respiratory gases
 - 4. Physical contaminants
 - 5. pH

- (b) Outline the experimental determination of water activity in a food sample. (10 marks)



- (a) Define each of the following:

- (i) commercial sterilization; process that employ chemical, thermal & physical methods to help eliminate or reduce microorganisms. (2 marks)
- (ii) dehydration; - is artificial removal of water from a food under forced or long or slow. (2 marks)
- (iii) cryogen; - use of extreme low temp to help in preservation of liquid nitrogen. (2 marks)
- (iv) Fo-value; - Time required to reduce no. of microbes in a suspension under a certain temp of 212°. (2 marks)

- (b) With the aid of labelled diagram, describe indirect freezing of liquids. (7 marks)



SECTION B (40 marks)

Answer any TWO questions from this section.

5. (a) State four benefits of food fermentation. (4 marks)
- (b) With the aid of chemical equations, describe the production of vinegar. (12 marks)
- (c) Outline the procedure for freshening of pickled products for use after storage. (4 marks)

1. Reduce water activity in foods
2. Reduce bulk in foods
3. Preservation
4. Easy transport of foods

6. (a) State **four** objectives for dehydrating food. (4 marks)

(b) Explain how each of the following factors affect the rate of drying in a dehydration process:

(i) constituent orientation; - eg size of particles etc. *the larger the solute molecules the slower it is to dry and the drying is dehydration* (4 marks)

(ii) solute concentration. - *high solute conc leads to faster dehydration as the conc of solute is high the solvent conc is lower and makes it easier to dry and dehydrate.* (4 marks)

(c) Figure 1 shows a typical dehydration curve.

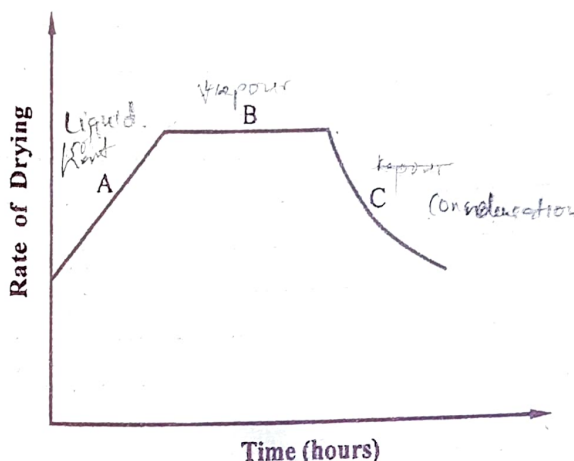


Fig. 1

Name the sections A, B and C on the graph and explain the events taking place in each of the sections. (8 marks)

A - ~~Heat~~ High temps are required in order to achieve latent heat. This helps separate the solid portion from liquid phase thro heating.

B - Here there is constant it comes to a constant where amount of vapour is equal to heat produced.

C - Vapour levels drop leaving behind solutes thus rate decreases.

7. (a) The following data was recorded when freezing two similar products P_1 and P_2 .

Time in hours	Freezing temperatures ($^{\circ}\text{C}$)	
	P_1	P_2
0	20	20
0.5	0	13
1.0	3	9
1.5	-7	5
2.0	-20	0
2.5	-20	-2
3.5	-20	-3
4.0		-3
4.5		-4
5.5		-9
6.0		-14
6.5		-20

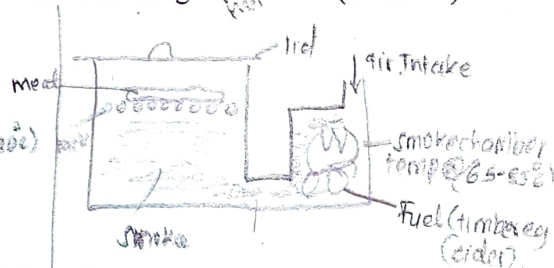
- (i) Plot the freezing curves for both products on the same graph. (5 marks)
- (ii) Identify the fast and slow freezing curve. (1 mark)
- (b) Explain 'refrigeration load' and 'freezer burn' as used in freezing. (4 marks)
- (c) (i) Explain the phenomenon of super cooling observed in freezing curve. (3 marks)
- (ii) Explain the negative effects of slow freezing. (7 marks)

8. With the aid of labelled diagrams, describe the two methods of smoking. (20 marks)



- This is smoking that is done under low temp b/w 15-20°C. It doesn't actually cook the meat but smokes it well. Use of preservative over it is a good smoking aroma that is desirable during smoking. Smoked for 2-4 hrs.

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- Hot smoking done @ temp around 65-85°C contributes to both smoking of the meat and kills microorganisms. At this temp, cooking is achieved requiring both aroma & flavour in the meat. Smoked for 2-4 hrs.