UNIVERSITI SAINS MALAYSIA

First Semester Examination
2010/2011 Academic Session

November 2010

IMK 308 –FOOD PRESERVATION PRINCIPLES
[PRINSIP PENGAWETAN MAKANAN]

Duration: 3 hours
Masa: [3 jam]

Please check that this examination paper consists of SEVEN pages of printed material before you begin the examination.

[Sila pastikan bahawa kertas peperiksaan ini mengandungi TUJUH muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]

Instructions: Answer FIVE questions. You may answer the questions either in Bahasa Malaysia or in English.

[Arahan: *Jawab LIMA soalan. Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]

1. Answer both parts of this question:

   (a) With the aid of a schematic phase diagram of water, explain the principle of freeze-drying and discuss the key features of freeze-drying.

   (10 marks)

   (b) Briefly explain the influence of food composition and freezing rate on the quality of a freeze-dried product.

   (10 marks)

2. Answer all parts of this question:

   (a) Define water activity

   (2 marks)

   (b) Briefly describe the factors controlling water activity of a food.

   (10 marks)

   (c) Comment on the following statement:

   "Reducing water activity inhibits microbial growth, it does not sterilize microorganisms."

   (8 marks)

3. Answer all parts of this question:

   (a) Briefly explain the antimicrobial action of sorbic acid.

   (7 marks)

   (b) Discuss the influence of pH and partition coefficient on the effectiveness of the food preservatives.

   (7 marks)

   (c) There are consumers who are against and for in the use chemical preservatives in food. Give your opinion

   (6 marks)

4. Answer all parts of this question:

   (a) State the food regulation under Malaysian food law that regulate the use of sulfite in food

   (2 marks)

(b) Explain how browning can be prevented by the use of sulfite in processed food

(10 marks)

(c) With suitable example explain how hurdle concept can be applied to preserve food.

(8 marks)

5. Answer both parts of this question:

(a) Discuss in brief on the various sources of ionizing and non-ionizing radiation that could be employed for preservation and shelf life improvement of food and agricultural commodities.

(10 marks)

(b) Briefly describe the advantage and disadvantages of employing radiation treatments for food preservation purposes.

(10 marks)

6. Answer all parts of this question:

(a) Describe the principles of preservation involved during the production of UHT milk

(10 marks)

(b) Write short notes on the following;

(i) Impingement freezer

(5 marks)

(ii) 12D Concept

(5 marks)

7. Answer all parts of this question:

(a) The following results were obtained in an investigation of the process of canning beans in tomato sauce; thermocouple position: geometric centre. T_R was 116^oC and cans were cooled in retort. The desired $F_{121.1}$ is 3.00 min and $z = 10^oC$.

time	Temperature (^oC)
0	26.7
15	73.9
25	93.9
30	100.3
40	107.2
50	110.3
64	112.8
75	112.8
80	108.9

(i) Comment on this process.

(5 marks)

(ii) Is it possible to use this data to calculate the process time using the Ball formula method? Explain your answer.

(5 marks)

(b) Comment on the following statements

(i) Batch sterilization wastes energy and can overcook the product being processed

(5 marks)

(ii) Vacuum hydrocooler is a very popular chilling equipment

(5 marks)

1. *Jawab kedua-dua bahagian soalan ini:*

   (a) *Dengan bantuan lakaran gambarajah fasa air, jelaskan prinsip pengeringan sejukbeku dan bincangkan ciri-ciri utama pengeringan sejukbeku.*

   (10 markah)

   (b) *Jelaskan dengan ringkas pengaruh komposisi makanan dan kadar penyejukbekuan ke atas kualiti produk tersejukbeku.*

   (10 markah)

2. *Jawab semua bahagian soalan ini:*

   (a) *Takrifkan aktivit air.*

   (2 markah)

   (b) *Huraikan secara ringkas faktor-faktor yang mengawal aktiviti air dalam sesuatu produk makanan.*

   (10 markah)

   (c) *Komen kenyataan berikut:*

   "Penurunan aktivit air menghalang pertumbuhan mikrobial, tetapi tidak mensterilasikan mikroorganisma."

   (8 markah)

3. *Jawab semua bahagian soalan ini:*

   (a) *Jelaskan secara ringkas tindak balas antimicrobial asid sorbik*

   (7 markah)

   (b) *Bincangkan pengaruh pH dan koefisien pemisah keatas keberkesanan bahan pengawet.*

   (7 markah)

   (c) *Terdapat konsumer yang menentang dan menyokong penggunaan bahan pengawet kimia dalam makanan. Berikan pendapat anda*

   (6 markah)

4. *Jawab semua bahagian soalan ini:*

   (a) *Nyatakan akta makanan dibawah 'Malaysian food law' berkaitan dengan penggunaan sulfite dalam makanan*

   (2 markah)

(b) *Terangkan bagaimana pemerangan dapat dihalang dengan penggunaan sulfite dalam makanan terproses*

(10 markah)

(c) *Dengan memberikan contoh yang sesuai terangkan bagaimana konsep pagar boleh diaplikasikan untuk mengawet makanan.*

(8 markah)

5. *Jawab semua bahagian soalan ini:*

(a) *Bincangkan pelbagai sumber radiasi pengion dan bukan-pengion yang boleh digunakan untuk pengawetan dan peningkatan jangkahayat makanan dan komoditi pertanian.*

(10 markah)

(b) *Huraikan secara ringkas kebaikan dan keburukan penggunaan rawatan radiasi untuk tujuan pengawetan makanan.*

(10 markah)

6. *Jawab semua bahagian soalan ini:*

(a) *Huraikan prinsip-prinsip pengawetan yang terlibat semasa penghasilan susu UHT*

(10 markah)

(b) *Tulis nota ringkas bagi yang berikut;*

(i) *Penyejukbeku hentaman*

(5 markah)

(ii) *Konsep 12D*

(5 markah)

7. Jawab semua bahagian soalan ini.

(a) Keputusan berikut diperolehi semasa proses pengalengan kacang dalam sos tomato; posisi alat termokupel: pusat geometrik. T_R adalah 116^oC dan kaleng disejukkan dalam retort. Nilai $F_{121.1}$ yang dikehendaki adalah 3.00 min dan z = 10^oC.

masa	*suhu (^oC)*
0	*26.7*
15	*73.9*
25	*93.9*
30	*100.3*
40	*107.2*
50	*110.3*
64	*112.8*
75	*112.8*
80	*108.9*

(i) Berikan komen anda mengenai proses ini.

(5 markah)

(ii) Bolehkah data ini digunakan untuk mengira masa proses menggunakan kaedah formula Ball? Jelaskan jawapan anda.

(5 markah)

(b) Berikan komen anda mengenai kenyataan berikut

(i) Pensterilan kelompok adalah membazirkan tenaga dan boleh menyebabkan produk terlebih-proses

(5 markah)

(ii) "vacuum hydrocooler" adalah alat pendingin yang sangat popular

(5 markah)

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