Mastership in Chemical Analysis

Part B Examination

Paper 1

Burlington House

30 October 2007

1300 – 1600

RSC | Advancing the Chemical Sciences

Instructions

Answer **five** questions out of eight.

The answers to each section must be returned in the examination script booklets provided. All examination scripts must be handed in at the end of the examination.

The marks allocated to each section are given.

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1. You are given a flow diagram of a bacon manufacturer's plant (**see over the page**). The production process includes curing, slicing and packing of bacon.

   (a) Explain how you would perform a Hazard Analysis Critical Control Point (HACCP) evaluation on the plant.

   (6 marks)

   Include, with reasons, the critical control points you would establish for the organisms:

   (i) *Staphylococcus aureus* **(3 marks)**

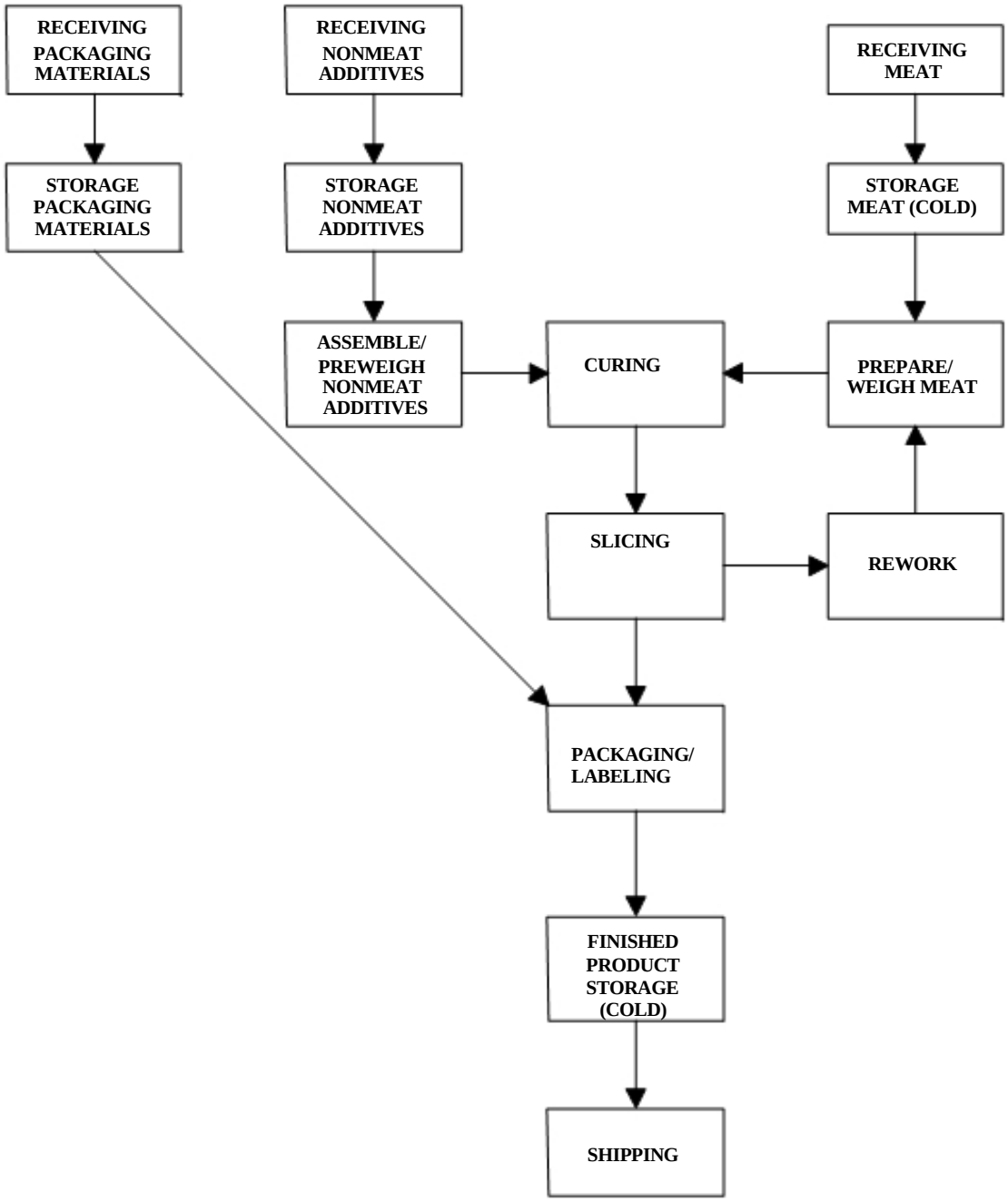
   (ii) *Clostridium botulinum* **(3 marks)**

   (b) Discuss, with brief explanations, other micro-organisms you would seek to control in a plant of this nature.

   (8 marks)

PROCESS FLOW DIAGRAM

PRODUCT: BACON



2. The composition of chocolate is controlled by the Cocoa & Chocolate Products (England) Regulations 2003 (and by the equivalent Regulations for Scotland or Wales)

(a) Give compositional standards for:

(i) Family Milk Chocolate **(4 marks)**

(ii) Plain Chocolate **(2 marks)**

(iii) Quality Plain Chocolate **(2 marks)**

(b) What are the difficulties in the analysis and interpretation of the results of those analyses in determining if a retail sample of Family Milk Chocolate complies with the requirements of the Regulations?

(12 marks)

3. (a) What are the legislative controls on the use of modified atmospheres in food packaging?

(2 marks)

(b) Discuss the applications of modified atmospheres in food preservation. In your answer include references to the types of atmosphere and the advantages and disadvantages when compared to other types of preservation.

(12 marks)

(c) Outline the techniques for the sampling and analysis of modified atmospheres in relation to food packaging.

(6 marks)

4. Consider The Food Supplements (England) Regulations 2003 (or the equivalent Regulations for Scotland or Wales)

(a) In the context of these regulations, how are the following terms defined?

(i) Food Supplement

(ii) Dose form

(3 marks)

(b) What additional labelling requirements do these Regulations impose on food supplements?

(6 marks)

(c) Vitamin analysis has been described as “random number generation”. Discuss, with examples, the difficulties encountered in the quantification of vitamins in food supplements.

(11 marks)

5. A member of the public has complained about lack of meat in one pasty from a pack of four "ready to bake" Cornish Pasties. The remaining three uncooked pasties have been submitted for analysis. The relevant part of the labelling and the results of the analysis of the three pasties are as follows:

10% Beef Pasties (uncooked) Declared Weight: 220g per pastie
Ingredients: PASTRY (66%): Wheat flour, margarine (vegetable oil), water salt, emulsifier (mono- and diglycerides of fatty acids), egg, salt, black pepper, FILLING (34%): potato, beef, water, swede, onion, modified maize starch, salt, maltodextrin, pepper, flavouring, spices

	Pasty 1	**Pasty 2**	**Pasty 3**
Weight raw pastie (g)	227	221	211
Weight filling (g)	75	80	60
Analysis of Filling:			
Moisture (g/100g)	74.8	76.2	76.4
Nitrogen (g/100g)	1.014	0.864	0.816
Fat (g/100g)	5.0	4.4	6.1
Ash (g/100g)	1.5	1.6	1.6
Carbohydrate by difference (g/100g)	11.8	12.4	10.8
Hydroxyproline (g/100g)	0.14	0.24	0.10

Calculate the allowable meat contents for the sample below, stating any assumptions and factors used and comment on your findings.

(**15 marks)**

Indicate, with reasons, what samples you would advise a trading standards officer to take from the manufacturing factory whilst investigating this complaint.

(**5 marks)**

6. The term “Carbohydrate” is defined in the Food Labelling Regulations 1996 as:

“any carbohydrate which is metabolised in man and includes polyols”.

(a) How would you define carbohydrate from a chemical point of view? What types of carbohydrate are found in foodstuffs?

(8 marks)

(b) Discuss the nutritional significance of the different types and give brief details of the means of analysis. Include in your answer reference to both natural and modified/synthetic types.

(12 marks)

7. For **ten** of the following, explain their function and give examples of foods in which they may be used:

(a) Norbixin
(b) Nisin
(c) Ferrous Gluconate
(d) Stannous Chloride
(e) Thaumatin
(f) Potassium Hydrogen Tartrate
(g) EDTA
(h) Papain
(i) Boric Acid
(j) Dichloromethane
(k) Propyl Gallate
(l) Glycerol

(2 marks each part, total 20 marks)

8 Briefly describe the techniques you would use to authenticate **five** of the following:

(a) King Edward potatoes
(b) Organic pork chops
(c) Earl Grey tea
(d) Heather honey
(e) Star anise (ground)
(f) A post-mix dispensed proprietary diet cola

(4 marks each part, total 20 marks)