Mastership in Chemical Analysis

Part B Examination

Paper 1

Online

Wednesday 13th October 2021

1330 - 1630
Instructions

Answer five questions out of eight.

The answers to each question must be returned in the examination envelope provided. All examination scripts must be handed in at the end of the examination.

The marks allocated to each question are given.

Unless otherwise stated, references to Statutes in England include the equivalent alternatives for Scotland, Wales and Northern Ireland.

Unless otherwise stated, any reference to Statutes includes the EU regulations that they enforce.

1. For each of the following techniques, describe how they can be used to determine the authenticity of herbs/spices and discuss their relative merits:
   
   i. Light microscopy
   ii. Infra-red spectroscopy
   iii. DNA analysis
   iv. Mass spectrometry

   (4 x 5 marks)  

   20 marks

2. Outline the current statutory or guideline requirements for assessing each of the following and briefly describe the analysis that you would use to assess whether the requirements are met.

   i. Acrylamide in Food
   ii. *Clostridium botulinum* controls in Vacuum/Modified Atmosphere packed food
   iii. Polycyclic aromatic hydrocarbons (PAH) in Smoked Fish
   iv. Histamine in Canned Tuna
   v. T-2 and HT-2 toxin in cereals and cereal products

   (5 x 4 marks)  

   20 marks
3.  
   a) Detail the legislation that covers Nutrition & Health Claims on Food.  
      12 marks

   b) Outline the analysis that would be carried out to establish whether each of the 
       following claims were correct:

      i.  “Source of Omega 3” in Mackerel Fillets
      ii. “Low in Saturated Fat” in a pack of potato crisps
      iii. “No added sugars” in a low calorie sparkling soft drink
      iv.  “High in Dietary Fibre” in a Cereal Bar

      (4 x 2 marks)  
      8 marks

4. What would you take into account to determine the shelf-life of each of the following 
   foods? In your answer include a discussion on the ways in which the shelf-life can be 
   predicted and verified.

   i. Raw Meat
   ii. A chocolate covered confectionery product
   iii. Dried Baby Food
   iv. Cold Smoked Salmon
   v. Non-Dairy Fats, Oils and Spreads

   (5 x 4 marks)  
   20 marks

5. Outline the regulations/guidance that control each of the following micro-organisms and 
   the methods that would be used in an Official Control Laboratory (OCL) for their 
   determination in Ready to Eat Foods (RTE):

   i. Listeria monocytogenes
   ii. Shiga toxin producing E coli (STEC)
   iii. Salmonella spp.
   iv. Bacillus cereus

   Include in your answer, food types that may be of particular risk with these micro-organisms.

   (4 x 5 marks)  
   20 marks

   i. (a) What is the ‘milk fat’ requirement laid down for a sales description ‘butter’?  
       1 mark

   (b) What is the fat (vegetable and/or animal) requirement for a sales description  
       ‘margarine’?  
       1 mark

   (c) Outline a procedure to determine the milk fat content in a dairy product in  
       relation to a suitable method, calculation and any challenges regarding the  
       calculation?  
       7 mark

(ii) (a) What is the legal definition of ‘virgin olive oils’?  
       2 mark

b) Commission Regulation No 2568/91 lays down quality characteristics including  
   organoleptic evaluation for various categories of olive oils.

   i. List four other quality characteristics  
       4 mark

   ii. Detail a method for determining one of these four  
       5 mark
7.

a) The Food Information Regulations 2014 list exemptions regarding the indication of the quantity of meat ingredients in non-prepacked foods containing meat and other ingredients. Give details of two such foods.  

   2 marks

b) Regulation (EU) No 1169/2011 lays down specific foods which are not required to bear a list of ingredients. Name two such foods.  

   2 marks

c) Give examples of where the name of a food is required to be accompanied by certain mandatory particulars.  

   3 marks

d) What are the compositional criteria regarding ‘fat’ and ‘collagen/meat protein ratio’ laid down in the regulation for:

   i. a minced meat containing pigmeat  
   2 marks

   ii. a lean minced meat  
   2 marks

e) Detail the analysis and calculations required to determine the collagen/meat protein ratio.  

   8 marks

f) Under what circumstance can a national mark not be used on a minced meat product?  

   1 mark
8. The Jam & Similar Products (England) Regulations 2003 lay down compositional requirements for reserved descriptions (specified products).

a) What is the minimum fruit pulp/puree content stipulated for the following finished products:

   i. blackcurrant jam 1 mark
   ii. strawberry extra jam 1 mark
   iii. orange marmalade 2 marks

b) Detail the specific labelling and description requirements for a jam. 4 marks

c) Name two of the additional ingredients permitted in a raspberry jam by these regulations. 2 marks

d) The Honey (England) Regulations 2015 lay down compositional criteria for certain product names. What are the criteria regarding:

   i. Fructose and glucose content of a blossom honey 1 mark
   ii. Hydroxymethylfurfural content for a honey of declared origin from a region with a tropical climate 1 mark
   iii. Sucrose content of a lavender honey 1 mark
   iv. Diastase activity for any honey (excluding baker’s honey) with a low natural enzyme content 1 mark

e) Detail a method for determining the diastase activity of a honey 6 marks

END OF PAPER