Mastership in Chemical Analysis

Part C Examination

University of Reading

4 September 2007

RSC | Advancing the Chemical Sciences

Section 1: Communication in the form of formal certificates

Prepare appropriate official certificates for the following samples:

1. You are presented with the following results of analysis for a bottled drinking water:

Odour		Ammoniacal
Appearance		Slight turbidity
pH		7.6
Conductivity	$\mu S\ cm^{-1}$	562
Ammonia	mg/l	0.75
MBAS	mg/l	0.31
Creatinine	mg/l	0.94
Aerobic Plate Count 22°C	no/ml	67000
Aerobic Plate Count 37°C	no/ml	3700
Enterobacteriaciae	no/ml	2400
Faecal Streptococci	no/ml	1200
Chloride as Cl^-	mg/l	125
Nitrate as NO_3^-	mg/l	18
Sulphate as SO_4^{2-}	mg/l	43
Phosphate as PO_4^{3-}	mg/l	1.41
Alkalinity as HCO_3^-	mg/l	225
Sodium as Na^+	mg/l	284
Potassium as K^+	mg/l	17
Calcium as Ca^{2+}	mg/l	81
Magnesium as Mg^{2+}	mg/l	7.3

(10 marks)

2. You are presented with the following results of analysis of a Formal sample described as “Sliced Smoked Salmon”:

Moisture	53.9 g/100g
Salt (ex chloride)	2.1 g/100g
Histamine	25 mg/100g
Fluorene	7.7 µg/kg*
Phenanthrene	210 µg/kg*
Anthracene	39 µg/kg*
Fluoranthene	78 µg/kg*
Pyrene	87 µg/kg*
Benzo(a)anthracene	18 µg/kg*
Chrysene/Triphenylene	31 µg/kg*
Benzo(b)fluoranthane	10 µg/kg*
Benzo(k)fluoranthene	6.8 µg/kg*
Benzo(a)pyrene	21 µg/kg*
Indeno(1,2,3-cd)pyrene	4.6 µg/kg*
Dibenzo(a,h)anthracene	0.8 µg/kg*
Benzo(g,h,i)perylene	5.4 µg/kg*

*[Analysed using an isotopic technique giving an effective recovery of 100%. The relative expanded measurement uncertainty was 30%]

(For the purposes of this exercise the labelling applied to this sample can be deemed satisfactory)

(10 marks)

3. You are presented with the following results of analysis for a Formal sample of fertiliser:

Total Nitrogen	12.6%
Phosphorus Pentoxide (total)	4.0%
Potassium Oxide (water soluble)	3.5%
Iron	4.1%

Relevant parts of the statutory statement are as follows:

Lawn Feed & Weed & Mosskiller
NPK Compound Fertiliser

Total Nitrogen	**12%**
Phosphorus soluble in mineral acids and in water	**3.0%**
Potassium soluble in water.	**2.5%**
Iron	**5.0%**

(10 marks)

Section 2: Microscopy

Carry out an examination including microscopy on each of the three specimens provided and report your findings:

4. A material found in an unlabelled container in a health food shop.

(10 marks)

5. A powder. **(10 marks)**

6. A sample of organic wholemeal flour from a small flour mill.

(10 marks)

Section 3: Problem Solving

Investigate as required and report as appropriate:

7. Following a production problem at a local production facility, a Trading Standards Officer has submitted informal samples of Christmas Puddings, following a complaint of metal particles being present on the puddings.

   Investigate the complaint, identify the cause, and recommend action that could be taken by the producer.

   (20 marks)

8. An incident has occurred. You will be contacted with further information during the course of the day.

   (20 marks)