

# ROYAL SOCIETY OF CHEMISTRY

## Mastership in Chemical Analysis (MChemA)

### Regulations, Syllabus and Guidance Notes 2012

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## 1 Introduction

The Mastership in Chemical Analysis (MChemA) is the statutory qualification for appointment by Food Authorities to the position of Public Analyst. A holder is qualified to be a Food Analyst and can become qualified to be a Food Examiner and an Agricultural Analyst.

An MChemA holder will be competent in matters relating to the chemistry, microbiology, and microscopy of food, water, and agricultural fertilisers and feeding stuffs.

### 1.1 Statutory Framework

Every Food Authority must appoint one or more Public Analysts under Section 27 of the Food Safety Act 1990 and an Agricultural Analyst and, if they see fit, one or more Deputy Agricultural Analysts under Section 67 of the Agriculture Act 1970.

#### Public Analyst

The MChemA is the statutory requirement of competency for the appointment of Public Analysts, as set out in the following:

#### **The Food Safety (Sampling and Qualifications) Regulations 1990** Regulation 3. **Qualifications of analysts**

A person shall be qualified to be a food analyst or, subject to regulation 5(1)[ which covers conflict of interest], a public analyst if he possesses a Mastership in Chemical Analysis awarded by the Royal Society of Chemistry".

#### Food Examiner

There is no single qualification for appointment as a Food Examiner. Regulation 4 of The Food Safety (Sampling and Qualifications) Regulations 1990 is as follows

#### **4. Qualifications of food examiners**

- (1) A person shall be qualified to be a **food examiner** if
- (a) he possesses a qualification listed in Part I of Schedule 2 [this list includes the MChemA], and
  - (b) subject to [various requirements], he has carried out examination of food over a period or periods amounting in the aggregate to at least three years in one or more of the laboratories set out in Part II of that Schedule [the schedule includes Public Analyst laboratories].

#### Agricultural Analyst

The prescribed qualifications for an agricultural analyst or a deputy agricultural analyst are set out in the Fertilisers (Sampling and Analysis) Regulations 1996 (SI 1996 No 1342). "...he shall possess a Mastership in Chemical Analysis awarded by the Royal Society of Chemistry or be a Chartered Chemist, being a Fellow or Member of the Royal Society of Chemistry, and that his practical experience of the analysis and examination of fertilisers shall be attested by another agricultural analyst..."

There is a similar requirement in the Feeding Stuff (Sampling and Analysis) Regulations 1999 for feeding stuffs.

## 2 The MChemA Examination

### 2.1 General information

The syllabus addresses the requirements for scientific control of the whole food chain. Agricultural analysis is therefore included, as well as the science of water as far as it impacts on food preparation and direct consumption. Candidates may be examined in any aspect of the statutory responsibilities of a Public Analyst.

In view of the broad scope of the responsibilities of the present day Public Analyst it is important that you should have adequate experience in a laboratory, such as a Public Analyst's laboratory, or other laboratory concerned with broadly based food, environment and relevant agricultural matters.

You may not have acquired work experience in all the relevant aspects of duties of a Public Analyst, so you may also need formal training and/or attendance at seminars, courses or exchange working in another laboratory. Your Counsellors will assist you in your preparation for the examination.

You will need to demonstrate that you have had a thorough grounding in the general principles underlying analytical chemistry and will have acquired a broad knowledge of relevant disciplines. In this latter respect special emphasis must be given to:

- (a) an understanding of the general scientific principles underlying sampling, examination, testing and analysis of a diverse range of materials, and
- (b) the interpretation of results obtained, recognising that such activities may lead to legislative or other executive action on the basis of a report made.

The examination is in three parts:

**Part A** is a three hour examination paper on the theory of general analytical chemistry.

**Part B** covers the applications of analytical chemistry in two three-hour examination papers. Part B will assess the essential core knowledge for the MChemA.

**Part C** provides the opportunity for you to demonstrate specific abilities that you possess in the application of the core knowledge and an opportunity to demonstrate your career experience. You submit a Portfolio of Evidence, which is formally assessed by the Examiners, and which must be deemed satisfactory before you may proceed to the one-day practical examination, which is held at a suitable laboratory.

Past examination papers, the application forms, dates of the examinations, closing dates for applications and the current fees are available on the RSC website at [www.rsc.org/mchema](http://www.rsc.org/mchema).

## 2.2 Counsellors

You are required to nominate two counsellors. Their primary role is to assist you in planning your studies and in improving your laboratory technique and analytical knowledge.

Throughout the training period, your counsellors are asked to bear in mind the requirements of the MChemA examination and the future responsibilities you will be required to discharge as a Public Analyst. During this period, counsellors should seek to develop your potential to the utmost. They should encourage you to adopt a questioning and constructively critical attitude to every facet of the day-to-day work of a Public Analyst's laboratory. You will need to become familiar with and, where possible, involved in decision-making processes. This may involve the operation of the laboratory, review of techniques, equipment purchase and commissioning, choice of staff, balancing the budget or any other aspect. In addition, opportunities should be afforded for you to demonstrate initiative and develop potential for leadership.

You should be encouraged to pursue your studies within a structured framework, including attendance at courses. You should be familiar with recent advances in your subjects, and the major textbooks and journals should be available to you. If possible, counsellors should support applications for appropriate paid study leave with expenses. Counsellors and candidates should meet at least once every three months. Your counsellors should be able to advise you when you are ready to take the examinations for each part of the MChemA.

## 2.3 Preparation for the examinations

Before attempting each part of the examination, you are recommended to answer some specimen questions and have these scrutinised by your counsellors. Answers should be structured, written legibly and concisely in good English and should demonstrate a critical scientific attitude.

Be sure to address the question asked and not to be drawn into discussing a related topic simply because you know more about it or are especially familiar with it from your own work experience. Examiners will only award marks for information that is relevant.

The style of the question will provide guidance on how much detail is required in the answer. If the question has two or more parts, the marks available for each part are stated. For example, this single part question requires a structured essay:

*“Discuss the development of standards for nutritional and health claims on food labels. (20 marks)”*

In contrast, this 5-part question asks you to provide brief descriptions for which you could gain a maximum of four marks for each part:

*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)*

“A picture paints a thousand words!” i.e. include diagrams, where appropriate, since this can be a much more effective way of illustrating something like a control chart than pages of text.

Recent past examination papers are available on the RSC website at [www.rsc.org/mchema](http://www.rsc.org/mchema), and older ones are available on request.

## **2.4 APA training courses and guides**

The Association of Public Analysts (APA) has produced a series of Training Guides, and also organises training courses to assist you in your preparation for the MChemA. The APA Training Committee has also devised a Record of Professional Training and Experience for candidates and counsellors to use to help structure your training. This is not formally examined as part of the MChemA examination, but it may be used to ensure that you are sufficiently prepared for the examination.

Further details about the courses and guides are available on the APA website at [www.publicanalyst.com](http://www.publicanalyst.com).

## **3 Registration and Part A**

### **3.1 Regulations for Registration and Part A**

You must be an Associate Member (AMRSC), Member (MRSC) or Fellow (FRSC) of the RSC to register, and you must achieve MRSC or FRSC by the time of application for the Part C Examination. You must maintain your RSC membership throughout the period of registration and examination, and you must register at least six months before you apply for Part B.

You should submit your Registration and Part A application form with your fee. Your application covers registration and Part A, whether you take the Part A examination or are applying for exemption. It includes one attempt at the Part A examination. If you need to resit the examination you will have to submit an additional fee.

The RSC may require you to attend for interview to assist in its consideration of your application.

You should nominate two Counsellors for approval by the RSC, one of whom should normally be a senior member of your own laboratory and the other a holder of the MChemA working in another laboratory. If you have difficulty in nominating a Counsellor, you should contact the RSC for advice. You should keep the RSC informed of any changes of address, post held and Counsellors.

There is a time limit for completion of the MChemA of six years from Registration. The Examinations Board have the discretion to extend this period. This applies to candidates registered after March 2002.

### 3.2 Syllabus for Part A

One paper of 3 hours duration. Five questions are to be answered out of eight. The pass mark is 40%.

Candidates will be expected to be familiar with theory relating to modern chemical analysis, Including, but not limited to, the following areas:

- Sampling
- Sample preparation, analyte extraction and pre-concentration procedures
- Calibration, standardisation, QA/QC and validation procedures
- Classical analytical methods, including cryoscopy, gravimetry, refractometry and Titrimetry
- Polarimetry
- Spectroscopic methods, including uv/visible, fluorescence, IR and Raman spectroscopy
- Atomic spectrometry, including atomic absorption, atomic emission and atomic fluorescence
- Chromatographic separation techniques including: gas chromatography, high performance liquid chromatography and ion chromatography
- Non-chromatographic separation techniques including distillation and electrophoresis
- Mass spectrometry, both elemental mass spectrometry (e.g. ICP-MS) and molecular mass spectrometry
- Hyphenated techniques e.g. GC-MS, LC-MS
- Electroanalytical techniques including voltammetry and potentiometry
- Radioanalytical chemistry and X-ray based techniques
- Methods for the analysis of DNA
- Enzyme and immunological techniques e.g. enzyme assays, ELISA.
- Microbiological assay
- Methods for data handling, including statistical analysis, the assessment of measurement uncertainty and simple chemometrics e.g. PCA
- Recent developments in analytical science

### 3.3 Exemption from Part A

For exemption from Part A you must either:

- (a) have completed successfully an approved postgraduate qualification containing appropriate taught analytical chemistry; or
- (b) be a Registered Analytical Chemist; or
- (c) have completed successfully a postgraduate qualification containing appropriate taught analytical chemistry and submitted it for approval to the RSC and been successful in that application for exemption; or
- (d) have completed successfully the NVQ level 5 in analytical chemistry.

Candidates with an appropriate MSc in analytical chemistry can apply for exemption. These courses are often amended and updated, and you should contact the RSC for advice on whether your qualification meets the requirements.

If you are applying for exemption from Part A, you should state on the application form how you have kept your analytical chemistry knowledge and skills up to date since you were awarded the qualification.

Further information on the NVQ Level 5 in analytical chemistry is on the website at [www.rsc.org/nvq](http://www.rsc.org/nvq).

### 3.4 Guidance Notes for Part A

You should be familiar with the theory and practice of modern analytical chemistry. The standard that is expected in the answers to questions in Part A of the examination is that of postgraduate level.

### 3.5 Part A Booklist

Questions may be set on any of the subjects contained within the syllabus for Part A of the examination. The following books are recommended:

Skoog, West, Holler and Crouch (2000), *Analytical Chemistry: an Introduction* (Harcourt Inc, Florida), 7th Edition.

Skoog, Holler and Crouch (2007) *Principles of Instrumental Analysis*, (Thomson Brooks/Cole), 6th Edition.

Harris (2010) *Quantitative Chemical Analysis* (Freeman, New York) 8<sup>th</sup> Edition

Miller and Miller (2005) *Statistics and Chemometrics for Analytical Chemistry* (Pearson Education Ltd, Harlow) 5<sup>th</sup> Edition.

Robards, Haddard and Jackson (2002) *Principles and Practice of Modern Chromatographic Methods*, Academic Press.

Lajunen and Peramaki  
(2004) *Spectrochemical Analysis by Atomic Absorption and Emission*, Royal Society of Chemistry.

Fifield and Kealey (2000) *Principles and Practice of Analytical Chemistry*, Blackie, 5<sup>th</sup> Edition.

Christian (2004) *Analytical Chemistry* (John Wiley & Sons Inc.) 6<sup>th</sup> edition.

Kellner (ed) (1998) *Analytical Chemistry* (Wiley-VCH, Weinheim).

## **4. Part B**

### **4.1 Regulations for Part B**

You must register for the MChemA at least 6 months before applying for Part B. You must have either successfully completed, or have been granted exemption from, Part A.

You should submit your Part B application form with your fee and your Part B Counsellors' form, completed and signed by your counsellors.

### **4.2 Syllabus for Part B**

Part B consists of two three hour theory examination papers, covering the essential core knowledge for this qualification in relation to Food, Water (for human consumption), and Agriculture, including policy and law relating to food, potable water and agriculture.

Paper 1 is on the topic of food. Paper 2 covers the topics of food policy, agriculture, and water for human consumption. Five questions are to be answered from eight in each paper.

The pass mark for each paper is 50%. If you achieve a mark of less than 50% in only one paper, you will be required to resit that paper only. Exemption from the paper in which you achieved a mark of 50% or greater will be given for one year only.

#### **Food**

- Analysis with Analytical Quality Assurance (including sampling, statistics and measurement reliability/uncertainty)
- Composition and Chemistry
- Microbiology and microbiological examination
- Nutrition
- Food manufacturing practice, including storage and spoilage
- Safety aspects of food, including the effects of contaminants on human physiology
- Policy and law relating to food

### **Water for Human Consumption**

- Analysis and microbiological examination
- Potable water including principles of water treatment and distribution
- Policy and law relating to potable water including bottled water

### **Agriculture**

- Analysis of fertilisers and feeding stuffs
- Analysis of residues, including pesticides, in food and water
- Policy and law relating to agriculture
- Animal and Plant Nutrition

### **4.3 Guidance Notes for Part B**

Before applying for Part B, you and your counsellors should consider the following:

- the level of your basic knowledge of physical, inorganic and organic chemistry as they apply to food, water and agriculture,
- whether you have a high/low degree of skill in applying the theory of analytical chemistry to the practical examination of foods, agriculture, water,
- whether you have the general experience and maturity required for the examination.

There is a Record of Training and Experience on the APA website ([www.publicanalyst.com](http://www.publicanalyst.com)) which you and your counsellors may use so that you can ensure that you are sufficiently prepared for the examination, and to provide a reference document for your counsellors to complete the Part B Counsellors' Form.

The distribution of questions between the two Part B papers is as follows:

Paper 1 (Food): attempt any five questions from eight.

Paper 2: attempt five questions:

Food law and policy	1 question from 2
Agriculture	2 questions from 4
Water	1 question from 2
	Free choice of 1 question from any of those not attempted above

## 5. Part C

### 5.1 Regulations for Part C

You must be registered for the MChemA and have successfully completed Part B. You must have achieved MRSC or FRSC by the date of registration for the Part C examination.

Part C comprises an assessment of your portfolio of evidence, followed by a one day examination of interactive and practical exercises. You must maintain a portfolio of evidence during the period of registration up to the successful completion of Part C of the examination. Pre-registration experience may be recorded. This portfolio of evidence will be assessed formally at Part C and is to be made available to the RSC for inspection as part of the assessment.

### 5.2 Syllabus for Part C

Part C provides the opportunity for you to demonstrate your abilities in the application of the core knowledge. It also provides an opportunity for you to demonstrate your analytical manipulative experience in relation to e.g. consumer products, toxicology, research and development, waters and the environment.

The scope of the Part C examination will include the syllabus for Part B.

The following areas of skill and knowledge will be assessed through examination and/or by your portfolio of evidence:

- (a) Communication in the form of formal certificates
- (b) Microscopy (Certificates will not be assessed during this exercise)
- (c) Communication and problem solving

During the practical part of the examination your awareness and understanding of matters related to the work of a Public Analyst will be explored, including analytical quality assurance, precision and error, sampling, and aspects of the environment pertinent to food safety and quality.

### 5.3 The Portfolio of Evidence

The portfolio presents a much abridged version of your practical experience. The examiners expect it to be of a professional standard, and you need to demonstrate competence in the areas of manipulative skills, report writing and product labelling. The portfolio is an integral part of the examination, and if it is unsatisfactory you will not be allowed to proceed to the practical examination.

Your portfolio of evidence should be submitted after your Part C application but by the specified date. You should submit **four** copies of your portfolio. This is to ensure that the examiners receive legible copies of the labels. You should number the pages for ease of

cross-referencing by the examiners. One copy of the portfolio will be returned to you after the Part C examination.

Your portfolio must include demonstration of the necessary competence with evidence of:

- (a) Manipulative skills: evidence that you have the necessary experience to be considered an expert
- (b) Report writing: 40 reports across the core areas of food, agriculture and drinking water
- (c) Product labelling: 40 labels showing a variety of faults
- (d) A list, with brief notes, of the Acts and Regulations in which the Public Analyst is mentioned as an Authorised Analyst. This is to ensure that you are aware that these activities may be part of your work in the future.

Your portfolio may include optional subject matter at your discretion for the purpose of assessment of manipulative skills, and also any related matter of which you have experience, for example:

- Consumer products
- Environmental Matters
- Waste Disposal (e.g. asbestos)
- Toxicology
- Research & Development
- Alcohol and Drugs in blood and other body fluids
- Occupational Hygiene including COSHH

You and your Internal Counsellor must sign the Portfolio of Evidence to certify that it is your own work. Your Counsellor is expected to refer to the following:

- That your record of practical ability is true and accurate in terms of methods, dates, depth etc
- That you are competent in the handling and investigation of food complaints (which may include feed complaints)
- That you have produced the certificates presented
- That you have interpreted the labels presented

It is accepted that counsellors will participate in advising you on your labels and certificates as part of your training, but ultimately the material presented to the RSC must be your own work.

Your portfolio of evidence will be assessed and deemed to be satisfactory or unsatisfactory by the examiners.

- If it is deemed to be satisfactory, you are eligible to proceed to the one day Part C practical examination.
- If your portfolio is deemed to be unsatisfactory by the examiners, you will be given guidance on what additional evidence is required.
- If your portfolio is deficient in only a limited area, the examiners will request further documentary evidence and/or you may be invited to attend a professional interview at the RSC. If this supplementary evidence is satisfactory, then you may proceed to the one-day Part C practical examination.
- If your portfolio is deficient in many areas, you may be required to re-submit it in the following year. You will only be able to sit the one-day Part C practical examination when the portfolio of evidence is deemed satisfactory.

#### **5.4 Guidance Notes for the portfolio**

The Portfolio of Evidence presents a much abridged version of your practical experience. The organisation of your portfolio is your own choice, but remember that the examiners are remote from your place of work, and provide them with sufficient guidance to locate the required information. You should number the pages and provide a contents page.

The examiners are looking for evidence that you have the necessary experience of laboratory manipulative skills in order to be considered an expert and to command respect.

This necessary experience can be demonstrated by;

- experience in analysis proficiency schemes such as FAPAS,
- documented records of research and development,
- published papers,
- internal papers,
- laboratory working notes (including method validation work and accreditation status).

#### **Areas of Competency**

The following areas of competency should be included in the Portfolio of Evidence.

**Manipulative Skills:** You are required to demonstrate expertise in the areas of manipulative skills. Food, agriculture and drinking water are core areas of the syllabus. Manipulative skills can be demonstrated in these or any other analytical field of activity such as consumer protection, environmental, swimming pool waters, etc. You need to demonstrate a wide experience of relevant skill areas, and are required to demonstrate competency in each of the following:

- classical wet chemistry
- speciation of fish and/or meat products
- instrumental techniques including chromatography and absorption/emission spectroscopy
- handling food and feed complaint samples.

You may demonstrate evidence of competencies and experience via the following methods:

**Achievement of Authorised Analyst Status** Direct transfer from laboratory UKAS accredited methods records. Dates of authorisation should be included. Where you have successfully completed a continuing competence assessment, this should be made as a new entry.

**Participation in Performance Assessment Schemes** Any scheme that has chemical manipulative involvement can be included, but the outcome must be satisfactory. Each time you participate satisfactorily in a scheme round then an entry should be made.

**Research and Development** Basic research involving chemical manipulation or development of a laboratory method may be used as evidence of competency. There must have been a specific measurable outcome to the exercise, e.g. the method was written up in a standard format for use. A brief outline of the research or development exercise should be appended at the end of this section.

**Method Validation** This is where you have been involved in the validation of the method, either as part of method development exercise or only in part. The extent of involvement should be made clear in the entry.

**Laboratory Records of Competence** Some methods used in a laboratory will not be on the laboratory's accreditation schedule. You may use these also as evidence of manipulative skills, but the method must be in written format. Ideally, a date should be entered against the entry to indicate when you were first considered competent in the procedure. If the Portfolio of Evidence is being completed retrospectively, then an estimate should be given.

**Published work** Where you have had work published then the associated laboratory work can be used as evidence of competence in that area. A copy of the publication should be appended to the end of this section.

### Report Writing

Writing reports is a critical skill for the public analyst. You should provide evidence of report writing across the core areas of food (including food complaints), agriculture and drinking water. Reports from other areas of activity may also be included. You should start practising report writing at an early stage of your training. Your reports should be of a high technical standard, but the Examiners recognise that you will be developing your competence and style, and they expect you to seek comments and advice from your Counsellors and other experienced colleagues.

Your reports should be written in formal style on Food Safety Act and Agriculture Act certificates as appropriate. You should include reports of samples where the product fails to meet the required standard, and of samples where the product shows multiple failures of standards.

The reports included for assessment should cover a range of irregularities to demonstrate a depth and breadth of knowledge. Only **one** example of each specific non-compliance should be given. The reports should be in final format of a standard suitable for receipt by the client.

The following information should accompany each report:

- Sample type
- Date of exercise
- Analytical data for the sample in question
- A note of the standard being applied. Where there is not a statutory standard, you should explain briefly the basis of the standard being used.
- Relevant information from the label which is being used to reach the decision, e.g. relevant parts of the ingredient list
- Any other relevant information that will assist in demonstrating your competency in report-writing

You should provide:

- The report on the appropriate certificate which you would issue in a “live” situation
- A facing page containing all the above accompanying information

### **Product Labelling**

You should provide evidence of your knowledge of product labelling law and its application. Your knowledge and competency must be demonstrated in the core areas of food, agriculture and drinking water. Labelling in other areas of activity may also be included. You should collect examples of irregular labels during your training period. Ideally, examples will be included where you have expressed an opinion or interpretation. Where the composition of an example is at odds with the label then, if desired, this should be included in the “Report Writing” section of the Portfolio of Evidence. This section should include examples of where labelling law is in question.

Forty labels should be included, showing a variety of non-compliances. An example of a “good” label should be included. Duplication of faults should be avoided.

A brief note should accompany each report explaining either:

- the irregularity or
- where the label is a “good” label, why it is so.

The notes should include:

- Sample type,
- Date of exercise,
- Legislation being applied,
- Discussion of where the example fails to meet the requirement,

- Where relevant, offer advice on how the label could be made to comply,
- Any other relevant information that would be useful as evidence to aid the examiners' assessment.

You should provide:

- The original label or a quality photocopy of the label
- A facing page containing the above accompanying information

**When you submit your portfolio, it should include:**

- 4 copies of the portfolio
- Your signature and your Internal Counsellor's signature attesting that the files are a true and accurate representation of your experience and are your own work
- Evidence of manipulative skills that must include:  
Wet chemistry  
Speciation of meat and/or fish species  
Instrumental techniques including chromatography and absorption/emission spectroscopy
- 40 Reports covering food, agriculture and drinking water, including microbiology and complaints
- 40 Reports for product labels including original/copies of labels and commentary
- A list, with brief commentary, of Statutes where the Public Analyst is mentioned as an authorised analyst

There is a copy of this checklist with the application form for Part C and it should be submitted with your portfolio.

## **5.5 The Practical Examination**

The one-day Part C practical examination will be undertaken at a suitable laboratory. The examination comprises eight compulsory questions:

- (a) Communication in the form of formal certificates
- (b) Microscopy (Certificates will not be assessed during this exercise)
- (c) Communication and problem solving

Part C is an "open book" examination. All items on the Part C booklist will be provided, and you can bring any other reference literature. However, the examiners reserve the right to indicate that certain items are not to be used or consulted during certain sections of the examination and may exclude any particular item absolutely.

During the examination your awareness and understanding of matters related to the work of a Public Analyst will be explored, including analytical quality assurance, precision and error, sampling, and aspects of the environment pertinent to food safety and quality. The examiners will conduct a short viva during the course of the examination to gain an insight into your approach to the problems. The overall pass mark for the practical part of the Part C Examination is 50%. You must also achieve the following minimum percentage marks in each section of the examination:

Communication in the form of formal certificates	50%
Microscopy	40%
Communication and problem solving	40%

If the minimum mark is not achieved in all sections, you must resit the whole examination and pay the Part C fee. If your subsequent attempt at Part C is more than one year after the first occasion, your portfolio of evidence must also be updated to demonstrate that the standard of the portfolio has been maintained.

## **5.6 Guidance Notes for the Practical Examination**

The practical examination is held in a suitable laboratory (usually the University of Reading). The Examiners aim to make the examination as realistic as possible and to have conditions similar to those in a well equipped Public Analyst's Laboratory. It is the aim of the Examiners to test your ability to act in the capacity as a Public Analyst.

The laboratory will be available on the afternoon prior to the examination for you to familiarise yourself with the surroundings and set up any personal equipment and books.

All the books on the Part C booklist will be provided from the University library. Standard disposable items of equipment (e.g. pipettes, microscope slides) will be available. Any stains, reagents and reference materials which you may need will be provided. You will need to bring a laboratory coat and any other item you deem necessary, for example a spatula, felt tip pen, dissecting kit, calculator, practical and other reference texts, statistical tables. You may wish to bring your own microscopes, but these can be provided if required.

Throughout the day you should record your thought processes and reasoning in the answer book as well as the final answers. The examiners need to know how you derived an answer, and if you got part way they will give you credit for this.

### **Communication in the form of formal certificates (3 questions)**

For each question, you will be provided with information from which you should prepare a formal certificate. You should select the appropriate form from the blank certificates provided. You should accompany your certificate with notes to explain your reasoning.

### **Microscopy (3 questions)**

Information may be given concerning the background or origin of the specimen. In addition to the laboratory microscope at between 50X and 500X magnification, you are expected to use observations with the naked eye and the stereo or dissecting microscopes to assist in identification. Other elementary tests can also be useful. You should make diagrams and drawings and provide notes and a summary including your identification and your reasoning for each specimen. You do not need to produce formal certificates for this section.

### **Communication and Problem Solving (2 questions)**

A series of samples, specimens or situations will be presented in a manner to simulate normal laboratory circumstances. Samples will be relevant to issues or problems actually encountered by a Public Analyst, Food Analyst or other professional analytical scientist. You will have to determine the information required, acquire and manage that information then report accordingly. The examiners will explain the requirements at the beginning of the exam, and they may volunteer additional information in stages throughout the day. You will not need to undertake your own experimentation, other than basic procedures such as observations of appearance and odour and microscopy as necessary, but you will direct the examiners in a manner similar to the way a laboratory or section head would direct her/his staff. The examiners will act as enforcement officers, sampling officers and laboratory technicians and/or assessors as required. You can request any other information you need. You should present your answer in the form of a report or official certificate of analysis or examination, as required by the question. In addition, you should present records of experimentation and document your reasoning for making the requests and coming to your conclusions. The examiners will carry out a short interview with you during the afternoon, to enable them to understand your thought processes and approach to the investigation.

### **5.7 Expectations of the Examiners**

The Part C practical examination tests not only your analytical skills but also your ability to tackle problems methodically and to test your investigative skills. A high standard of presentation of practical work and preparation of certificates is essential. Your Counsellors should insist that all investigative work is properly recorded.

You will be expected to demonstrate that you possess the qualities and attributes necessary to practice as a Public Analyst or Food Analyst. The examiners expect you to have a wide knowledge base and are looking for:

- a highly responsible attitude,
- an ability to respond to various situations in which analytical chemistry plays a significant role,
- the capability to carry out analytical investigations.

You should apply for the Part C examination when you and your counsellors are confident that you have achieved the following;

- a sound basic knowledge of the analytical chemistry of foods, agricultural materials and water
- expertise in report and certificate writing,
- practical expertise in the use of the microscope for the quantitative and qualitative examination of the above,
- a working knowledge of the basic principles of the following in relation to the examination of foods and water; bacteriology, entomology and mycology,
- the general experience and maturity required for the examination,
- have produced a Portfolio of Evidence with relevant information of the required standard for Part C.

## 5.8 Booklist for Part C

Questions may be set on any subject in the syllabus for Part C. Candidates may bring any books and texts to the practical examination, and the following texts will be available:

ADAS: Handbook RB427 - The Analysis of Agricultural Materials, 1986

AOAC: Official Methods of Analysis – 12th, 14th, 16th, 18th editions

BUSVINE: Insects and Hygiene - 3rd edition

BUTTERWORTHS: Law of Food & Drugs (Vols 1-7)

CHAMOT & MASON: Handbook of Chemical Microscopy (Vol II)

DEVELOPMENTS in Food Analysis Techniques (Vol 1-3), King

FEIGL: Spot tests in Inorganic Analysis, 1989, 7<sup>th</sup> English Edition

GREENISH & COLLIN: Anatomical Atlas of Vegetable Powders

HOLDEN (ed): Water Treatment and Examination

HMSO: Analysis of Raw, Potable and Waste Waters

KENT-JONES & AMOS: Modern Cereal Chemistry

MERCK Index – 14<sup>th</sup> edition, 2006

PARRY J W: Spices - Their Morphology, Histology & Chemistry

The Particle Atlas, Vol II, McCrone & Delly, 1973

PEARSON: Chemical Analysis of Foods – 8<sup>th</sup> edition (1981); revised 1987

PEARSON'S: Composition and Analysis of Food, 9<sup>th</sup> edition, R S Kirk & R Sawyer, 1991

PEARSON: Laboratory Techniques in Food Analysis

RSC Official, Standardised and Recommended Methods of Analysis, 1994, 3<sup>rd</sup> Edition

SMITH G: Industrial Mycology, 7<sup>th</sup> edition, 1981

VAUGHAN J G: Food Microscopy, 1979

VAUGHAN J G: The Structure and Utilisation of Oil Seeds

VOGEL: Textbook of Quantitative Chemical Analysis 6<sup>th</sup> edition 2000

WALLIS: Textbook of Pharmacognosy - 5th edition

WINTON & WINTON: Structure and Composition of Foods (Vols 1-4)

Food Chemicals Codex, 6<sup>th</sup> edition 2008

## 6. Award of the MChemA

When you have completed Part C successfully, the award of the MChemA will be confirmed by the MChemA Examinations Board.

## 7. Continuing Professional Development

MChemA holders are expected to maintain a commitment to Continuing Professional Development(CPD).

Continuing Professional Development has been defined by the RSC as *“the responsibility of individuals for the systematic maintenance, improvement and broadening of knowledge and skills to ensure continuing competence as a professional throughout their career.”*

CPD can be carried out in a number of ways; through formal methods (e.g courses or seminars), or informal methods (e.g. reading professional journals; networking with other professionals). An acceptable scheme has been devised by the Association of Public Analysts.

The RSC has published a CPD framework. CPD summary sheets for Analytical Chemists are available on request from the Registration Officer or are available on the RSC website at [www.rsc.org/Membership/memberzone/cpd/index.asp](http://www.rsc.org/Membership/memberzone/cpd/index.asp). Only the summary sheets (last 4 pages) need to be returned to the RSC. Your own entries from the APA CPD scheme or the RSC scheme can be used to prepare this brief summary.

MChemA holders who can provide 2 years of CPD returns are eligible to be considered for admission to the Analytical Chemists Register. There is a retention fee for this register of £25 annually. This will be requested with the membership subscriptions. Further information is available on the RSC website at [www.rsc.org/analchem](http://www.rsc.org/analchem).

RSC members who hold Chartered Scientist (CSci), and from 2012, Chartered Chemist (CChem), will be required to confirm maintenance of CPD and may be requested to return evidence of this to the RSC.

## 8. MChemA application documents

- MChemA Regulations, Syllabus and Guidance Notes
- past MChemA examination papers
- Examiners' Reports
- MChemA Examination dates and fees
- Application forms for
  - Registration and Part A
  - Part B
  - Counsellors' form for Part B
  - Part C

These are available on the RSC website at [www.rsc.org/mchema](http://www.rsc.org/mchema).

## 9. Contact for further information

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