-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number- **3180963** **-Session- 1993-94**

-Superclass- **RD**

-Title- **INSTRUMENTAL CHEMICAL ANALYSIS ($x^1/_2$)**

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Performing experimental analyses, processing results and describing the basis of selected instrumental analyses.

OUTCOMES

1. perform experimental analyses;

2. process recorded experimental results;

3. describe the basis of selected instrumental analyses.

CREDIT VALUE: 0.5 NC Credit

ACCESS STATEMENT: Higher Chemistry at band C or above or module 3161271 Experimental Procedures-chemistry and an appropriate selection of stage 2 modules.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

This specification is distributed free to all approved centres. Additional copies may be purchased from SQA (Sales and Despatch section) at a cost of £1.50 (minimum order £5).

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

STATEMENT OF STANDARDS

UNIT NUMBER: 3180963

UNIT TITLE: INSTRUMENTAL CHEMICAL ANALYSIS

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME

1. PERFORM EXPERIMENTAL ANALYSES

PERFORMANCE CRITERIA

(a) The preparation for the analysis is correct with respect to the setting up of an analytical instrument.
(b) The chemical and instrumental procedures carried out are safe and correct.

RANGE STATEMENT

The range statement for this outcome is specified within the performance criteria.

EVIDENCE REQUIREMENTS

Practical evidence of the ability to set up an analytical instrument and carry out the chemical and instrumental procedure. Both performance criteria must be achieved on 3 occasions, each covering a different instrumental analysis, procedures, and adhering to the relevant safety requirements.

OUTCOME

2. PROCESS RECORDED EXPERIMENTAL RESULTS

PERFORMANCE CRITERIA

(a) The presentation of the experimental data is accurate and in an appropriate format.
(b) The calculation of the analytical results from the experimental data is accurate.
(c) Conclusions drawn from the analytical results are valid.

RANGE STATEMENT

The range statement for this outcome is specified within the performance criteria.

EVIDENCE REQUIREMENTS

Written evidence of the ability to present the experimental data and calculate the analytical results within a given level of precision. Both performance criteria must be carried out on 3 occasions each for a separate analysis.

OUTCOME

3. DESCRIBE THE BASIS OF SELECTED INSTRUMENTAL ANALYSES

PERFORMANCE CRITERIA

(a) The description of the chemical principles of the analysis is correct.
(b) The description of the instrumental basis of the analysis is correct.

RANGE STATEMENT

The range statement for this outcome is specified with the performance criteria.

EVIDENCE REQUIREMENTS

Written evidence of the ability to describe both chemical principles and the instrumental basis of the analysis. Both performance criteria must be carried out on 3 occasions, each for a separate analysis.

ASSESSMENT RECORDS

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of support notes).

Accurate records should be made of assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or

checklists, etc. Records of candidates' achievements should be kept. These records will be available for external verification.

SPECIAL NEEDS

In certain cases, modified outcomes and range statements can be proposed for certification. See references at end of Support Notes.

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

SUPPORT NOTES

UNIT NUMBER 3180963

UNIT TITLE INSTRUMENTAL CHEMICAL ANALYSIS

SUPPORT NOTES: This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 20 hours. The use of notional design length for programme design and timetabling is advisory only.

PURPOSE This module would be suitable for candidates who have a limited experience of the use of instrumental methods in chemical analysis and require a more in-depth knowledge of the appropriate basic chemical principles.

SQA publishes summaries of NC units for easy reference, publicity purposes, centre handbooks, etc. The summary statement for this unit is as follows:

> this module will introduce you to a limited number of instrumental methods used in chemical analysis.

CONTENT/CONTEXT This section is for guidance only and the context/context relevant to the candidates area of study/employment/nature should be chosen. However, only other instrumental methods of chemical analysis may be added and "wet" chemical analytical methods may not be included.

The 3 analytical instrumental methods should be selected from different sections of the following list:

(a) gas liquid chromatography;
(b) high performance liquid chromatography;
(c) ultra violet/visible spectroscopy;
(d) infra-red spectroscopy;
(e) nuclear magnetic spectroscopy;
(f) flame emission spectroscopy (flame photometry);
(g) atomic absorption spectroscopy;
(h) electrophoresis;
(i) conductimetry;
(j) potentiometry;
(k) any other instrumental analytical method.

APPROACHES TO GENERATING EVIDENCE This half module is essentially practical and formal lecturing combined with discussion and demonstration would be required only to clarify difficult concepts, common problems and the correct and safe use of unfamiliar instrumental and chemical methods.

Each candidate shall carry out their own analyses and through the use of the checklist any failure to perform the individual practical tasks correctly should be identified immediately thus allowing remediation to take place so that the candidate may attempt a reassessment before moving onto further steps in the overall analysis. Where the presentation of experimental data, calculation of results and comments are not satisfactory for the attainment of Outcome 2 provision should be made for remediation and reassessment.

Where candidates do not submit a satisfactory report for the attainment of Outcome 2 provision should be made for remediation and reassessment.

Where candidates do not submit a satisfactory report for the attainment of Outcome 3 candidates should be afforded remediation to cover the deficiencies in their submission prior to reassessment.

ASSESSMENT PROCEDURES Centres may use the instruments of assessment which are considered by tutors to be most appropriate. In order to achieve this unit, it is suggested that candidates could carry out 4 exercises and must present sufficient evidence that they have met all the performance criteria for each outcome for at least 3 of the exercises, as specified within the evidence requirements.

Outcome 1 Practical exercises will be used to assess the candidate's performance. Checklists could be devised to indicate that the candidate carries out the use of the chemical and instrumental operations safely and correctly. Candidates should be made aware of the content of the checklists prior to commencing the analytical technique.

Outcome 2 An assignment could be asked here whereby the candidate presents experimental data and carries out calculation of results as indicated in instruction sheet for each analysis.

Outcome 3 A series of structured questions should be answered covering the theoretical aspects of the chemical and instrumental methods involved in each analytical technique

An appropriate number of questions should be set in order that the performance criteria and evidence requirements are met.

PROGRESSION Candidates could progress onto advanced courses in chemistry, however they are recommended to study the full module 3180042 Chemical and instrumental Techniques prior to this.

RECOGNITION Many SQA NC units are recognised for entry/recruitment purposes. For up-to-date information see the SQA guide 'Recognised and Recommended Groupings'.

REFERENCES

1. Guidelines for Module Writers.
2. SQA's National Standards for Assessment and Verification.
3. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
4. Procedures for special needs statements are set out in SQA's guide 'Students with Special Needs'.