-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

NATIONAL CERTIFICATE MODULE: UNIT SPECIFICATION

GENERAL INFORMATION

-Module Number- **3181313** **-Session-1993-94**

-Superclass- **RD**

-Title- **INTRODUCING QUANTITATIVE CHEMISTRY ($x^1/_2$)**

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Applying the mole concept in a variety of simple calculations and carrying out a practical experiment relating to chemical reactions.

OUTCOMES

1. apply the mole concept in a variety of simple chemical processes;

2. carry out a practical experiment to determine empirical formula of a compound.

CREDIT VALUE: 0.5 NC Credit

ACCESS STATEMENT: Introduction to Chemistry. The candidate should also be able to perform numerical calculations and proportions.

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).

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STATEMENT OF STANDARDS

UNIT NUMBER: 3181313

UNIT TITLE: INTRODUCING QUANTITATIVE CHEMISTRY

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. APPLY THE MOLE CONCEPT IN A VARIETY OF SIMPLE CHEMICAL PROCESSES

PERFORMANCE CRITERIA

(a) The calculations involving the relationship between number of moles and quantity of a solid substance are correct.
(b) The calculations involving the relationship between number of moles and quantity of substance in solution are correct.
(c) The balanced symbol equation derived from a given description of a chemical reaction is correct.
(d) The calculation of reacting quantities in a reaction given a balanced symbol equation is correct.
(e) The calculation of an empirical formula from given experimental results is correct.

RANGE STATEMENT

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

EVIDENCE REQUIREMENTS

Written evidence of the ability to perform the calculations involving the relationship between number of moles and quantity of a solid substance, and number of moles and quantity of substance in solution as specified above.

Performance Criterion (a) must be achieved at least twice on one occasion. Performance Criterion (b) must be achieved at least twice on one occasion. Performance Criterion (c) must be achieved at least 3 times on one occasion. A symbol equation must require balancing on at least 2 of these times.

Performance Criterion (d) must be achieved at least 2 times on one occasion.

Performance Criterion (e) must be achieved at least twice on one occasion and the mole ratio for each question must be different.

An appropriate performance level must be used when judging sufficiency of evidence (refer to assessment procedures in support notes).

OUTCOME

2. CARRY OUT A PRACTICAL EXPERIMENT TO DETERMINE EMPIRICAL FORMULA OF A COMPOUND

PERFORMANCE CRITERIA

(a) The preparation for the experimental procedure is correct with respect to the setting up of apparatus.
(b) The experimental procedures carried out are correct with respect to instructions and safety.
(c) The report including the calculation is complete and accurate.

RANGE STATEMENT

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

EVIDENCE REQUIREMENTS

Practical evidence of the ability to carry out one experiment including preparing for the experiment and completing a report.

An appropriate performance level must be used when judging sufficiency of evidence. (refer to assessment procedures in support notes).

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.

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SUPPORT NOTES

UNIT NUMBER 3181313

UNIT TITLE INTRODUCING QUANTITATIVE CHEMISTRY

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 is designed to introduce the candidate to some basic concepts of chemistry. It is suitable for candidates in a wide range of vocational areas.

It could be integrated with other National Certificate provision or used as a standard module.

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 the skills of applying the mole concept in a variety of simple calculations, and carrying out a practical experiment relating to chemical reactions.

CONTENT/CONTEXT Relating to Outcomes 1 and 2:

1. Relative atomic mass; calculation of formula masses; the mole as the gram formula mass of a substance; solute, solvent, solution; concentrations of solutions in mole 1^{-1}; using balanced equations to calculate masses of reactants or products; empirical formulae; writing equations using symbols and formulae from descriptions and word equations; balancing equations; state symbols.

2. Determination of empirical formula of for, example, magnesium oxide; copper oxide; lead iodide.

APPROACHES TO GENERATING EVIDENCE During the work of the module candidates should have several opportunities to develop their practical and problem-solving skills. Each candidate should be assessed at appropriate points throughout the module. Where a candidate is unsuccessful in achieving an outcome, provision should be made for remediation and reassessment. Laboratory practical work is likely to play a significant part in this module.

Safety considerations should be observed at all times.

Each performance criterion may be assessed separately.

A candidate-centred, resource-based approach is likely to be the most flexible for this module. Tutor exposition and demonstration may be required for introduction of a practical technique and for consolidation of the outcomes. Opportunities for computer interfacing may also arise.

ASSESSMENT PROCEDURES Centres may use the Instruments of Assessment which are considered by tutors/trainers to be the most appropriate. Examples of Instruments of Assessment which could be used are as follows:

Outcome 1: It is recommended that 11 numerical questions are set here to match the evidence requirements for the performance criteria. The questions should be allocated to each performance criterion as follows:

PC (a) - 2 questions
PC (b) - 2 questions
PC (c) - 3 questions
PC (d) - 2 questions
PC (e) - 2 questions

Thus an appropriate performance level will be the full and correct completion of all 11 questions.

Outcome 2: A practical exercise should be set here, where the candidate carries out a practical experiment. A checklist should be devised to ensure the candidate's completion of the practical exercise.

PROGRESSION The candidate may progress onto other stage 1 modules and stage 2 chemistry modules.

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'.