



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Qualifications Framework Levels 1–3, 2004

Chemistry

National Moderator's Report

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General Guidance for Assessors of Achievement and Unit Standards

The purpose of external moderation is to provide reassurance that assessor judgements are at the national standard and are made on the basis of assessment materials that are fair and valid.

All assessment materials are expected to:

- give the student the opportunity to meet the requirements of the standard
- have an assessment schedule that gives evidence of appropriate student responses and clear judgements at all levels.

The Ministry of Education contracted subject experts to write assessment resources for achievement standards. These are not pre-moderated. The intention is that they are modified to suit teaching programmes and learner needs. They do not provide 'rules' but suggest different ways of assessing to the nationally-registered standard.

General Overall Comment

The moderation of internally assessed achievement standards and unit standards in Chemistry has proven to be effective in establishing national consistency of assessment materials and assessor judgements.

The majority of schools assessing against Level 2 and Level 3 achievement standards have used the exemplars from the TKI website or have used modified versions of these exemplars.

Level 2 achievement standards were generally well assessed, as this was the second year of using these for many providers. It needs to be noted that there have been changes made to these achievement standards for 2005.

LEVEL 2

AS 90305: *Carry out qualitative analysis*

The second criterion requires a distinction to be made between Achievement, Merit and Excellence based on the ability of the learner to identify unknown ions in solutions. The assessor is advised to test solutions before students carry out the activity. This is necessary as there may be conflict between the cation and anion of a substance when following the procedure to identify the ions, as well as unexpected difficulty due to the concentration of a solution.

Ensuring there is no conflict between cation and anion present in an unknown solution will be important with Version 2 of this standard. As well, ensure that in determining the ions present there are sufficient precipitation and complex ion formation reactions available to demonstrate ability in writing appropriate equations to support conclusions made.

Assessment schedules need to be solution specific and provide examples of expected evidence specific to the actual unknown solutions used.

AS 90306: *Perform an acid–base volumetric analysis*

The second criterion requires a distinction to be made between Achievement, Merit and Excellence based on the ability of the student to solve problems related to volumetric analysis. This requires the assessor to provide a standard solution for which the concentration is given to 3 significant figures.

Assessment schedules need to provide examples of expected evidence specific to the actual unknown solution used. In particular, the expected titre for the titration as determined by the assessor.

Students able to read a burette to a higher level of accuracy, eg to 0.05 mL or 0.02 mL rather than just 0.1 mL, generally obtain an average titre of greater accuracy.

Data gained from the analysis must be recorded in a way that can easily be interpreted. Initial and final burette readings are required, as well as the titre used.

AS 90307: *Carry out a gravimetric or colorimetric analysis and solve related problems*

The second criterion requires a distinction to be made between achievement, merit and excellence based on the learner's ability to solve problems involving varying number of steps. It is expected that for excellence learners are able to present their answers accurately and with appropriate units.

LEVEL 3

AS 90694: *Carry out an extended practical investigation into variations in the amount of substance*

The first criterion requires a distinction to be made between Achievement, Merit and Excellence based on the plan developed and the ability to carry this out. This requires that students determine any standard solutions that are required, and that they make and standardise these solutions. For Excellence, the description of the method must show a clear understanding of the overall analytical technique.

The second criterion requires a distinction to be made between Achievement, Merit and Excellence based on the ability of the student to process data collected and to present a report. For Merit and Excellence the quality of the report must be considered, rather than just the quantity of data collected. The discussion must show evidence of some critical thinking. Trivial comments, such as those related to the student's lack of care, or simply that more experiments should have been carried out, are not sufficient to illustrate critical thinking.

The work involved with this standard has been new for many providers and often the achievement levels awarded have been too generous. The requirements for the levels of achievement are described in Explanatory Note 7 of the standard and these requirements need to be considered carefully.

The report should not contain 'everything'. It needs to include the method used, a summary of data and a sample to indicate how the data has been processed. The raw data will be available in the log book. The log book will also contain the detail related to the making and standardising of solutions. The method needs to describe how variables are controlled and how samples are collected, as well as how the experiments are carried out.

The purpose of the investigation needs to be appropriate to Level 8 of the curriculum. The investigation *into variations of amount of substance* does not require a hypothesis that is then proven or disproven. The conclusion must refer back to the aim of the experiment and the purpose of the investigation.

For Excellence, a valid conclusion can only be reached by repeating experimental work. The experiment must be repeated for at least one new sample of the material involved. It may be that a valid conclusion cannot be made, as the repeated experimental work may produce different results. However, the method must include steps to determine whether valid results are achieved. Students have been taught to repeat a titration to obtain concordant titres but do not always recognise whether the titre gained is a sensible one.

Material sent in for the moderation process must include the report and log book as well as annotated examples of student work to indicate the expected standard and judgements made.

Issues identified in moderation include:

- supplying students with a 'recipe' and given procedure to follow to process the data gained. Consequently, students have little evidence to show any understanding of the results obtained
- titre values so small that they would barely exceed the uncertainty of measurement involved if this were calculated
- inclusion of inappropriate graphs, no linking of background material to the investigation, lack of detail in log books
- inappropriate use of significant figures.

AS 90695: Determine the composition of an oxidant or reductant by titration

The first criterion requires a distinction to be made between Achievement, Merit and Excellence based on the degree of accuracy in carrying out a titration.

The second criterion requires a distinction to be made between Achievement, Merit and Excellence based on the ability of the student to carry out the related calculations. This requires the assessor to provide a standard solution for which the concentration is given to 3 significant figures. Merit requires a student to understand the data collected during the titration so that the values selected lead to a valid calculation for a solution. Excellence requires that a student is able to determine original concentrations, as well as present values, with accuracy.

Assessment schedules need to provide examples of expected evidence specific to the actual unknown solution used. In particular, the expected titre for the titration as determined by the assessor.

Students able to read a burette to a higher level of accuracy, eg to 0.05 mL or 0.02 mL rather than just 0.1 mL, generally obtain an average titre of greater accuracy.

Data gained from the analysis must be recorded in a way that can easily be interpreted. Initial and final burette readings are required, as well as the titre used.

UNIT STANDARDS

Assessors have a clear understanding of the national standard, tasks are appropriate and judgements are accurate.