Introduction

This lab book contains details relating to each of the 24 practical tasks specified as part of the content of WJEC GCE A level Chemistry. Detailed instructions are given for most tasks but some of them require an element of planning. In these cases, basic details are given and you must, for example, plan your own concentration ranges for a rates experiment or plan a method to identify unknown compounds.

Centres are free to amend these tasks or include preferred exercises provided that the same practical skills are developed, for example, any soluble salt can be prepared by titration.

Following completion of the specified practical tasks you should be able to

- apply investigative approaches and methods to practical work and think independently when undertaking practical work
- use a wide range of experimental and practical instruments, equipment and techniques appropriate to the knowledge and understanding included in the specification

Guidance notes

Methods of data collection and analysis

You should be able to

- describe with the aid of a clearly labelled diagram, the arrangement of apparatus for the experiment and the procedures to be followed
- describe how the data should be used in order to solve a problem or reach a conclusion
- set up apparatus correctly without assistance and follow instructions given
- undertake and record trial readings to determine the suitability of ranges and intervals where appropriate
- take repeat readings where appropriate
- make and record accurate measurements

Risk assessment

You should be able to assess the risks of your experiment.

Hazard	Risk	Control measure

Hazard – an object or chemical + the nature of the hazard

Risk – an 'action' in the method that can create a risk from a hazard

Control measure – must be practicable in the context of the practical

You will be required to produce your own risk assessment for some exercises. When you are not asked to do so centres must ensure that appropriate risk assessments are carried out in advance of all practical work.

Each exercise includes details of the hazards associated with the chemicals used. This does not amount to an appropriate risk assessment.

Table of results

You should be able to

- present numerical data and values in a single clear table of results
- use columns headings for both quantity and unit e.g. Volume HCl / cm^3
- include columns for all the primary data and values calculated from them
- record primary data to the same number of decimal places as the apparatus resolution e.g. if volume is measured to the nearest 0.05 cm^3 then all volumes in the column should be recorded to the nearest 0.05 cm^3

Recording readings and significant figures

All primary data should be recorded to the resolution of the apparatus used. Any data calculated from the primary data should be given to the same number of significant figures (or a maximum of one extra) as the primary data. The number of significant figures should be consistent within a column of data.

Graphs

You should be able to

- include a title and axes which are labelled with scales and units
- make sure the scales are convenient to use, so that readings may easily be taken from the graph – avoid scales which use factors of 3 – and that the plotted points occupy at least half of both the vertical and horizontal extent of the graph grid
- consider carefully whether your plotted points suggest a straight line or a curve, then draw in your best fit line either with the aid of a ruler or (if a curve) by a freehand sketch
- determine the gradient of a graph, showing clearly the readings you use by drawing a right angled triangle (this should be large so that accuracy is preserved)

Estimating uncertainties

You should be able to

- identify the measurement which involves the greatest uncertainty (based on apparatus resolution), likely to be a volume or temperature
- express the uncertainty (single value and difference between two readings) as a percentage of the measured value
- express the result to a sensible number of significant figures (4 sig figs for 0.1%; 3 sig figs for 1% and 2 sig figs for 10%)

Conclusions and evaluations

You should be able to

- use data to solve a problem or reach a conclusion
- evaluate experimental methods and suggest improvements