



14-19 CHANGES  
A LEVEL

# *Support Materials*

## **GCE Chemistry A H034/H434: Practical Skills Handbook**

**Version 1.3**

**AS/A Level Chemistry A**



## Practical Skills Handbook

### **GCE Chemistry A**

OCR Advanced Subsidiary GCE in Chemistry A H034

OCR Advanced GCE in Chemistry A H434

This Practical Skills Handbook is designed to accompany the OCR Advanced Subsidiary GCE and Advanced GCE specifications in Chemistry A for teaching from September 2008.

***OCR will update this document on a regular basis. Please check the OCR website ([www.ocr.org.uk](http://www.ocr.org.uk)) at the start of the academic year to ensure that you are using the latest version.***

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## **Version 1.3**

The only changes made since version 1.2 are the incorporation of updated screenshots on pp. 9 and 10, the inclusion of an Interchange Help Sheet as an Appendix and the removal of FAQs, these will be made available as a separate document in the future. No other changes have been made.

# 1 Introduction

New GCE A/AS specifications in Chemistry have been introduced for teaching from September 2008. The new specifications are set out as units, subdivided into teaching modules. Each teaching unit is assessed by its associated unit of assessment. Guidance notes are provided within specifications to assist teachers in understanding the requirements of each unit.

This Handbook plays a secondary role to the Specification itself. The specification is the document on which assessment is based and this Handbook is intended to elaborate on the content of the specification to clarify how skills are assessed and what practical experience is necessary to support an assessment. The Practical Skills Handbook should therefore be read in conjunction with the Specification.

During their study of Chemistry, candidates are expected to acquire experience of planning, carrying-out, interpreting, analysing and evaluating experiments and it is important to recognise that these aspects of practical work require both teaching and continuing practice. Experience has shown that evaluating experiments and suggesting improvements to the procedures employed is a difficult skill for candidates to master.

Planning skills will **not** be directly examined as part of the centre-based assessment but may be tested within the theory papers at both AS and A2 levels. Other skills will be internally assessed by the centre using the scheme shown on the next page.

## 2 The assessment model

### Summary of the model

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Practical and investigative skills developed within contexts encountered during Advanced Subsidiary GCE Chemistry (for Unit F323) or Advanced GCE Chemistry (for Unit F326) are assessed by means of three types of task (Qualitative, Quantitative and Evaluative) at each level.

Thus, candidates are required to carry out **three** tasks at AS and **three** tasks at A2:

1. Qualitative task [10 marks]
2. Quantitative task [15 marks]
3. Evaluative task [15 marks]

Tasks will be chosen from a selection provided by OCR *via* the secure Interchange website. Initially, a choice of three Tasks will be offered for each type. All Tasks will be refreshed or replaced each year and additional tasks may be made available. They will be available until 15 May in each year. Tasks for the following year will be available from early June.

The Qualitative and Quantitative tasks will test skills of observation, recording and reaching valid conclusions.

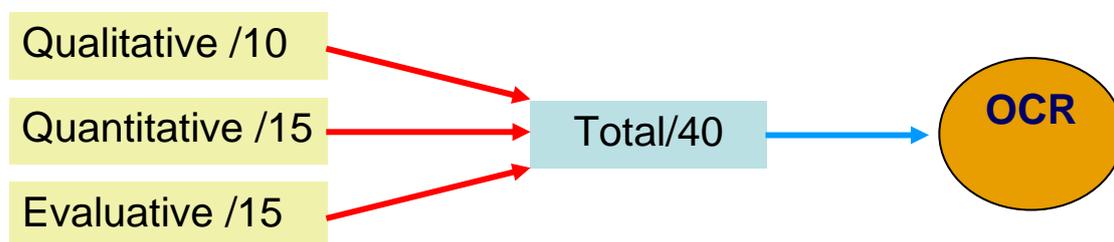
The Evaluative task will test the ability to analyse and evaluate the procedures followed and/or the measurements made. Candidates may also be asked to suggest simple improvements that would increase the reliability or accuracy of an experiment. The Evaluative task may be linked to either a Qualitative or a Quantitative experiment but no further data collection will be required. Any additional data required will be supplied within the Evaluative task.

**Candidates carry out all of their assessed tasks under direct teacher supervision.**

Each task is internally assessed using a mark scheme provided by OCR *via* the Interchange website.

**Candidates may attempt more than one task from each task type with the best mark from each type being used to make up the overall mark. A candidate is only permitted one attempt at each task.**

For each candidate, centres will supply OCR with a single mark out of 40.  
 Each practical skills unit is teacher assessed and externally moderated by OCR.  
 Although practical tasks can be used throughout the year, entry for the AS and the A2 practical skills units is available only in the June session of each year.



The mark schemes supplied by OCR will be based on the following criteria:

	<b>Assessable learning outcomes</b>
<p><b>1. Qualitative Task</b></p> <ul style="list-style-type: none"> <li>Candidates carry out a practical task using instructions supplied by OCR.</li> </ul>	<p>Candidates should be able to:</p> <ol style="list-style-type: none"> <li>demonstrate skilful and safe practical techniques using suitable qualitative methods;</li> <li>make and record valid observations and organise results suitably.</li> </ol>
<p><b>2. Quantitative Task</b></p> <ul style="list-style-type: none"> <li>Candidates carry out a practical task using instructions supplied by OCR.</li> </ul>	<p>Candidates should be able to:</p> <ol style="list-style-type: none"> <li>demonstrate skilful and safe practical techniques using suitable quantitative methods;</li> <li>make and record accurate measurements to an appropriate precision;</li> <li>analyse, interpret and evaluate experimentally derived results quantitatively to reach valid conclusions.</li> </ol>
<p><b>3. Evaluative Task</b></p> <ul style="list-style-type: none"> <li>This task may extend one of the qualitative or quantitative tasks.</li> <li>Candidates will evaluate the quality of the data and procedures.</li> <li>Evaluative tasks will <b>not</b> require additional data collection.</li> </ul>	<p>Candidates should be able to:</p> <ol style="list-style-type: none"> <li>analyse and interpret data, identify anomalies and reach valid conclusions;</li> <li>assess the reliability and accuracy of an experimental task; identify significant weaknesses in experimental procedures and measurements;</li> <li>understand and propose simple improvements to experimental procedures and measurements.</li> </ol>

The assessment of practical skills will include the following qualities which will need to be developed before candidates carry out the practical tasks.

	<b>Quality A1</b>	<b>Quality A2</b>
<b>Strand A</b>	Demonstrate skilful and safe practical techniques using suitable qualitative methods.	Demonstrate skilful and safe practical techniques using suitable quantitative methods.

	<b>Quality B1</b>	<b>Quality B2</b>
<b>Strand B</b>	Make and record valid observations; organise results suitably.	Make and record accurate measurements to an appropriate precision.

	<b>Quality C1</b>	<b>Quality C2</b>
<b>Strand C</b>	Recognise and interpret data, identify anomalies and reach valid conclusions.	Analyse, interpret and evaluate experimentally derived results quantitatively to reach valid conclusions.
	<b>Quality C3</b>	<b>Quality C4</b>
	Assess the reliability and accuracy of an experimental task; Identify significant weaknesses in experimental procedures and measurements.	Understand and select simple improvements to the experimental procedures and measurements.

The qualities assessed by each task type, Qualitative, Quantitative and Evaluative, are shown below.

#### F323: AS Task Types

Task type	Quality								Assessment outcome			Total
	A1	A2	B1	B2	C1	C2	C3	C4	AO1	AO2	AO3	
<b>Qualitative</b>	✓		✓								10	10
<b>Quantitative</b>		✓		✓		✓			3	2	10	15
<b>Evaluative</b>					✓		✓	✓	3	2	10	15
<b>TOTAL</b>												<b>40</b>

#### F326: A2 Task Types

Task type	Quality								Assessment outcome			Total
	A1	A2	B1	B2	C1	C2	C3	C4	AO1	AO2	AO3	
<b>Qualitative</b>	✓		✓								10	10
<b>Quantitative</b>		✓		✓		✓			2	3	10	15
<b>Evaluative</b>					✓		✓	✓	2	3	10	15
<b>TOTAL</b>												<b>40</b>

## Downloading Practical Skills tasks

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Tasks, Mark Schemes, and Instructions for Teachers and Technicians are provided to centres (as separate PDF files combined into one zip file) via OCR's secure website, Interchange (<https://interchange.ocr.org.uk>).

Copies of the *Chemistry A Data Sheet*, the Practical Skills Handbook and coursework forms are also available via Interchange and via OCR's public website ([www.ocr.org.uk](http://www.ocr.org.uk)).

**(PDF files require the use of adobe acrobat reader. Free copies of acrobat reader are available from <http://www.adobe.com/uk/products/acrobat>; If you use Windows 95, 98, ME, or NT, a zip program such as WinZip or PKZip can be used to extract the files. Windows XP has a built-in zip extractor.)**

### How to use OCR Interchange

OCR Interchange is a secure extranet enabling registered users to administer qualifications on-line. Your Examinations Officer is probably using OCR Interchange to administer qualifications already. If this is not the case, then your centre will need to register.

Your Examinations Officer will be able to:

- download the relevant documents for you by adding the role of 'Science Coordinator' to their other roles or
- make you a New User (Science Coordinator role) so that you can access the GCE Chemistry A pages and download documents when you need them.

The website address for Interchange is:

<https://interchange.ocr.org.uk>

<p>The teacher who has downloaded these materials is responsible for ensuring that they are stored securely so that candidates do not have the opportunity to access them. A record should be kept of the dates on which materials are downloaded.</p>
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Distribution of the Practical Tasks is limited to those candidates who are currently undertaking that Task. Task sheets should be photocopied and issued to candidates at the start of the Task. They must be counted out and in; numbering the documents may help to keep track of them. All unused Tasks and candidates' scripts must be collected after the assessment and stored securely or destroyed.

**Candidates must not take Tasks out of the room where assessments are taking place.**

**Under no circumstances can candidates be allowed to see the mark schemes.**

Science Materials pages are arranged according to qualification level and subject (see below).

The screenshot shows the OCR Interchange website interface. At the top, the logo 'OCR interchange' is visible with the tagline 'RECOGNISING ACHIEVEMENT'. The user is logged in, and there are links for 'Help' and 'Log out'. A 'Print page' link is also present. The breadcrumb trail indicates the user is in 'Home > Science co-ordinator materials'. The main heading is 'Science coordinator materials'. Below this, there are three bullet points: 'Entry Level', 'GCSE Gateway', and 'GCE AS/A2'. A box labeled 'Qualification level' has an arrow pointing to 'GCE AS/A2'. Below the bullet points, there is a paragraph of text: 'The GCE stimulus materials are **confidential** and should only be made available to students as hard copy for a limited period of time. Under no circumstances should these materials be posted to a website where they can be accessed by the public.' A box labeled 'General GCE information' has an arrow pointing to this paragraph. Below the text, there is a note: 'Before undertaking assessment of Practical Skills it is recommended that teachers familiarise themselves with the Practical Skills Handbook.' The main content area lists subjects: 'Biology', 'Chemistry A', 'Chemistry B (Salters)', 'Geology', 'Human Biology', and 'Physics A', each with a 'More detail' link. A box labeled 'Subject (click to view)' has an arrow pointing to 'Chemistry A'. On the left side, there are two navigation menus: 'By task' and 'By qualification'. The 'By task' menu includes links for 'Entries', 'Coursework and tests', 'e-assessment', 'Certification claims', 'Results', 'Post results', 'Centre information', and 'Assessors'. The 'By qualification' menu includes links for 'GCE, GCSE, Principal Learning...', 'OCR Nationals', 'Functional Skills', 'Skills for Life', 'NVQ', 'Vocationally related', and 'CLAIT and iPro'.

The user simply clicks on the relevant link to access the relevant subject material. Any important notices are shown at the top of the page along with useful supporting materials (e.g. the specification, the Practical Skills Handbook, forms) and a 'Getting started' file (which includes an Abstract and title for each assessment task for the current assessment year). Tasks are arranged according to level and type (Qualitative, Quantitative and Evaluative, see below). Hovering the mouse pointer over a Task or document link generates a summary of the file.

Simply clicking on the Task link allows you to download the zipped material to your desktop. The zip file contains everything you need to complete the task (instructions, task and mark scheme). All files have a unique name so there is no danger of overwriting material on your computer.

The screenshot shows the 'Chemistry A' page on the Interchange website. The page is organized into several sections:

- Admin Menu:** Located on the left, it includes options like 'By qualification', 'GCE, GCSE, Principal Learning...', 'OCR Nationals', 'Functional Skills', 'Skills for Life', 'NVQ', 'Vocationally related', and 'CLAIT and IPo'.
- Notices:** A central section containing several informational notices, some with red 'i' icons. One notice mentions 'Note to teachers/technicians' regarding trial experiments and moderation.
- E-mail updates:** A section below the notices that provides instructions on how to register for email notifications by emailing [GCESciencetasks@ocr.org.uk](mailto:GCESciencetasks@ocr.org.uk).
- Supporting Materials:** A section on the right listing various downloadable documents such as 'Getting Started', 'Practical Skills Handbook', 'GCE Chemistry A Specification', 'GCE Chemistry A Data Sheet', 'GCE Chemistry A Spreadsheet', 'Centre Authentication Form (CCS160)', 'Coursework Enquiry Form', and 'Sent Report Form'.
- Task Lists:** At the bottom, there are two sections for 'AS' and 'A2' levels. Each section is divided into 'Qualitative Tasks', 'Quantitative Tasks', and 'Evaluative Tasks'. Each task is listed with a file icon and its name (e.g., 'Task 1', 'Task 2', 'Task 3') and size (e.g., 'ZIP 410KB').

Five callout boxes with arrows point to specific features:

- Important notices appear here:** Points to the 'Notices' section.
- Additional information regarding registering for e-mail updates:** Points to the 'E-mail updates' section.
- Document summary (activated by hovering the mouse pointer over a link):** Points to the 'Getting Started' document in the 'Supporting Materials' section.
- Supporting materials for download, e.g. forms, specification, Practical Skills Handbook, Getting Started file:** Points to the 'Supporting Materials' section.
- Zipped Tasks for download:** Points to the task listings in the 'AS' and 'A2' sections.

## E-mail updates

To be notified by e-mail when changes are made to the **GCE Chemistry A** page on Interchange please e-mail [GCESciencetasks@ocr.org.uk](mailto:GCESciencetasks@ocr.org.uk) including your centre number, a contact name and the subject line **GCE Chemistry A**. It is strongly recommended that all centres register for e-mail updates.

## Registering for Interchange

If your Examinations Officer is not already a registered user of Interchange then he/she will need to register before the Chemistry A Tasks can be downloaded.

This is a straightforward process:

- Go to the website – <https://interchange.ocr.org.uk> ;
- The first page has a New User section;
- Click on Sign Up to access the OCR Interchange Agreement Form 1;
- Download this document and fill in your details;
- Return form by post to OCR Customer Contact Centre, Westwood Way, Coventry, CV4 8JQ or fax the form back to 024 76 851633;
- OCR will then contact the Head of Centre with the details needed for the Examinations Officer to access OCR Interchange.

**Also see Appendix 2.**

## Administration and regulations

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### Availability of Tasks

Mark schemes, Tasks and Instructions for Teachers and Technicians will be available until **15 May** in each year. Tasks for the following year will be available from early June.

It is intended that Tasks should form part of the normal teaching programme and so may be taken by candidates at any time during the year. Where possible, a Task should be administered immediately after the knowledge, understanding and skills required for the Task have been taught.

Level	Unit & Task	First Tasks on Interchange by	Coursework submission date
AS	F323 Qualitative (x3) Quantitative (x3) Evaluative (x3)	June 2008	15 May each year from 2009
A2	F326 Qualitative (x3) Quantitative (x3) Evaluative (x3)	June 2009	15 May each year from 2010

### Security

**It is the responsibility of the centre to ensure that downloaded Tasks, mark schemes, instructions (including any copies made of these documents), and candidates' scripts are stored securely. Any breach in security must be reported to OCR as soon as possible by submitting a written report (a blank report form is available on Interchange) from the Head of Centre to the Subject Officer detailing the circumstances, the candidates concerned and any action taken.**

The instructions for each assessed Task contain information to allow teachers to check the availability of the necessary apparatus and chemicals and for any solutions to be prepared in advance.

Tasks, mark schemes and Instructions can be downloaded at any time as long as they are kept secure. The instructions summarise the information that may be given to candidates regarding assessed Tasks; no other information must be given either directly or indirectly to candidates relating to the content of the Tasks or the marking.

Candidates' scripts for all completed Tasks must be stored securely and they should be available for moderation. Centres should retain Tasks securely until such time as they are clear that candidates will not wish to re-submit work to OCR in future sessions. At this point the work should be securely destroyed.

## How to use the Tasks

There are at least three Tasks available of each type: Quantitative, Qualitative and Evaluative. These may be used in a variety of ways. For example, candidates may complete all three of the Quantitative Tasks and the teacher can then submit the best mark. Alternatively, the teacher may use the first Task for formative assessment, the second for submission of marks and keep the third in reserve in case a particular candidate does not perform well on the second Task.

A candidate is not permitted to have more than one attempt at a single Task, or to re-write or change a Task once it has been submitted to the teacher for marking.

## The experiments

The experiments used in the Tasks have been trialled. The Instructions provided should ensure that the candidates are able to collect appropriate data in the time available. However, it is vital that the teacher trials the Tasks before they are attempted by the candidates to ensure that:

- appropriate materials and equipment are available;
- the experiment works and generates the expected data.

On some occasions it may be necessary to provide a data set against which candidates' results can be compared. In such cases this requirement will be stated in the Instructions for Teachers and Technicians.

Teachers may make appropriate changes to the materials and apparatus listed in the Instructions where these make provision easier/cheaper and they have no impact on the outcome, or demand, of the experiment. Other changes can be made to, for example, volumes/concentrations/amounts in order to make the experiment work as intended and to ensure that candidates are able to make appropriate observations/measurements. **All such changes may be made without OCR's approval**, but details must be retained and made available to the Moderator when work is submitted.

Details of changes made must be notified to OCR by e-mail to **GCEsciencetasks@ocr.org.uk**. Remember to include the centre number on all e-mails.

We will acknowledge all e-mails but will only respond in detail where there are concerns over suggested modifications. OCR may update the materials on the Interchange website where this is appropriate. If there are any issues with any of the experiments **that cannot be satisfactorily resolved by the centre**, details should be provided to OCR using the same e-mail address.

## Centres with more than one teaching group

It is recognised that some centres are likely to have more than one group with lessons timetabled at different times. In these circumstances, centres are asked to ensure that a particular Task is carried out by all the groups in as short a period as possible.

## Absence at the time of an assessment

If a candidate is absent from a centre when an assessment is carried out, the Task may be set at an alternative time provided that the centre is satisfied that security has been maintained by keeping all materials secure.

## Candidates with access arrangements

Candidates who are eligible for access arrangements and need additional time for the Evaluative Task may be given up to 25% extra time and their name should be recorded on the Interchange Access Arrangements site. Where other access arrangements are required, applications should be made to OCR at the beginning of the course using the standard forms and procedures in the Joint Council regulations and guidance document. However, it should be remembered that these Tasks are intended to assess practical skills. Credit is given to those skills which the candidate has performed independently. The Disability Discrimination Act lays no duty on awarding bodies to make reasonable adjustments with respect to the application of a competence standard or, in this case, the assessment objective being tested.

## Unexpected circumstances

If an unexpected problem (such as a fire alarm or other circumstance beyond the teacher's control) occurs while an assessed practical Task is taking place, the Task may be resumed subsequently provided the teacher ensures that no candidate is likely to have been advantaged or disadvantaged by doing so.

## Support allowed for candidates

All practical Tasks will be accompanied by appropriate instructions. Teachers may provide additional safety instructions (including written advice) if this is felt to be necessary.

**Candidates will not be permitted to refer to their class notes or to books during the Task except where specifically indicated on the Task cover sheet and Instructions. Use of the *Chemistry A Data Sheet* (available from Interchange and [www.ocr.org.uk](http://www.ocr.org.uk)) is allowed.**

If it becomes necessary for a teacher to provide a candidate with assistance during the course of a practical Task, the work may still be marked alongside the work of other candidates but the Task sheet must be annotated to indicate the assistance given. The teacher should use their professional judgement to award marks appropriately.

## Supervision

All Tasks must be carried out under the direct supervision of the teacher. However, they are not practical examinations and there is no requirement for 'examination conditions' to be imposed. Candidates may need to interact as they collect materials or use particular pieces of apparatus, but the teacher should set up the Tasks so that this interaction is kept to a minimum. The teacher must ensure that candidates do not copy from, or assist, each other so that s/he can with confidence authenticate the work of each candidate.

## Authentication

It is the responsibility of the centre to ensure that the work submitted for assessment is that of the candidate involved.

## Group work

Candidates must work individually to collect their own data. However, where a Task requires the collection of a large data set, instructions may include the pooling of data from a number of candidates and each candidate will then work with the same large data set. It will always be expected that each candidate contributes his/her data to the pool. In some cases candidates may need to share equipment or apparatus and the centre must make arrangements for this to take place without disadvantaging any candidates.

## Time allowed for Tasks

Quantitative and Qualitative Tasks are not time restricted: most have been designed to be conducted in a single practical session lasting about an hour. However, there may be a number of circumstances in which it is not possible to complete the work in the time available; for example, there may be difficulties with the experiment, a fire alarm or a shortage of equipment. In such cases, candidates' work should be collected in and issued to them again at the start of the next lesson. They must **not** take the work away with them or complete it without supervision.

Evaluative Tasks should be completed within 1 hour.

Some Qualitative and Quantitative Tasks may require the use of two practical sessions. Where this is the case, the Task may be divided to allow a convenient point at which the experiment can be set aside for completion in the second session. In such cases the candidate Task sheets may be provided in two sections.

## Submission date for work

Candidates' marks must be despatched to the Moderator and to OCR to arrive by 15 May in the year of the examination.

The following forms (available both from Interchange and [www.ocr.org.uk](http://www.ocr.org.uk)) must be included with the submitted marks:

- Centre authentication sheet (CCS160);
- Details of any changes made to the experiments. (Changes can be marked up on a blank copy of the Task or Instruction sheet). Please attach a copy of any correspondence with OCR;

An interactive Marks Spreadsheet is also available on Interchange for recording marks; if this is used it will help the Moderator if a copy is included with the submitted marks.

The Moderator will ask for a sample of work. If there are ten or fewer candidates at the centre, all work submitted should be sent to the Moderator to arrive by 15 May.

### **Internal standardisation**

A centre must set up an internal standardisation procedure to ensure that all teachers at the centre are applying the mark schemes in the same way. This procedure could include double marking of a sample of candidates, or the remarking of work by a senior member of staff.

### **Coursework consultancy**

OCR offers a coursework consultancy service whereby centres can send up to four photocopies of marked work to OCR for commentary by a senior Moderator. If a centre wishes to make use of this service, work should be submitted to OCR no less than 8 weeks before the coursework submission date (15 May). The coursework enquiry form is available at [www.ocr.org.uk](http://www.ocr.org.uk) and on Interchange.

### **Repeating Tasks**

Candidates can only attempt a Task once. However, if they score poorly on a Task they may take another Task from within that Task-type.

## Marking advice for teachers

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The marking schemes provided to centres have been made as explicit and as easy to apply as possible. Teachers should note that the mark schemes are not hierarchical. A measure of professional judgement may sometimes be necessary.

Once the work has been collected in, it must be marked by the teacher as it stands. **Under no circumstances can a candidate be allowed to change or elaborate on an answer.**

Teachers are reminded that it is possible for a candidate to be assessed on another occasion using a different Task and that the best mark achieved for each Task type should be submitted. It is appropriate for the teacher to provide feedback to explain how the work could have been improved although details of the mark scheme must not be directly communicated to the candidate.

Tasks should be marked clearly, in red ink, and in accordance with the Task-specific mark scheme. Annotation can help the Moderator and staff in the centre who are checking the marking as part of internal standardisation.

### **Useful annotations consist of:**

- ticks and crosses against responses to show where marks have been earned or not earned;
- specific words or phrases to confirm why a mark has been earned or indicate why a mark has not been earned (e.g. indicate an omission).

Where a candidate has given an answer not covered by the mark scheme, the teacher should use his/her professional judgement to decide whether the answer is worthy of credit. If it is, then the script should be annotated accordingly and the mark(s) awarded.

## 3 General requirements for AS and A2 practical work

Suggested practical activities have been included within the specification at the end of each module. Whilst carrying out these practice experiments during the course is not a requirement, their purpose is to ensure that the skills required for assessment will have been covered. Alternative experiments may be chosen but centres should be careful to consider whether sufficient experience will have been provided for candidates prior to the use of the assessed Tasks.

### Skill development

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There are generic skills which should be developed during the study of AS and A2 Chemistry. The sophistication required of candidates should increase throughout the course, partly as their practical experience grows but also through the extra demands expected by more complex experiments.

#### General

At both levels, the course aims to provide candidates with the opportunity to:

- develop good laboratory technique;
- make and record accurate measurements and observations;
- interpret the results of experiments to form theories or conclusions;
- establish whether data collected from experiments is valid and reliable;
- evaluate experimental technique and scientific method in light of practical experience;
- gain a knowledge of laboratory safety and the safe use of chemicals;
- learn the importance of careful waste chemical disposal and the potentially harmful effects of chemicals on the environment.

In teaching, teachers should focus on the key areas above whilst developing the candidates' skills through a coherent practical programme.

In carrying out practical Tasks, candidates should acquire the necessary experience to be able to carry out the Qualitative, Quantitative and Evaluative Tasks that will be tested by the assessed Tasks.

#### Qualitative Tasks

Candidates should be able to:

- identify any hazards in the chemicals to be used or made, noting down appropriate control measures (e.g. fume cupboard, eye protection, protective gloves, extinguishing naked flames);
- handle safely flammable, corrosive, toxic and harmful materials, including solids, liquids and gases;
- use appropriate techniques, reagents and apparatus to complete suitable activities;

- manipulate standard laboratory apparatus safely and with confidence to produce accurate data;
- record all suitable observations and data in an appropriate format and to an appropriate degree of accuracy, taking into consideration the apparatus used;
- use and record the correct units for all measurements taken;
- provide simple conclusions based on the observations made.

### Quantitative Tasks

Candidates should be able to:

- carry out quantitative experiments with appropriate care and precision;
- make and record measurements reliably and accurately;
- perform calculations, based on their practical work;
- use units accurately;
- use appropriate numbers of significant figures consistent with their least accurate measurement;
- construct and interpret appropriate graphs from data collected or provided;
- reach a valid conclusion based upon the data obtained from experiments.

### Evaluative Tasks

Candidates should be able to:

- recognise anomalous results on the basis of measurements taken or provided;
- identify the limitations of accuracy in experimental procedures;
- recognise that some errors may be inherent in the apparatus used;
- calculate percentage errors involved in measurements taken using:
  - (i) volumetric flasks, pipettes and burettes,
  - (ii) measuring cylinders, thermometers and balances;
- evaluate both the procedural and measurement errors associated with a particular experiment and comment on the most significant errors;
- suggest sensible improvements to experimental procedures and the taking of measurements based on their laboratory experience

## 4 Practical work for AS Unit F323

This section provides a summary of the practical experience and skills that will be acquired by the use of the experiments suggested in the modules or by the use of equivalent Tasks devised by the centre.

### F321 Atoms, Bonds and Groups

- (a) Volumetric analysis techniques to include:
- (i) use and preparation of a pipette to measure accurately a fixed volume of solution;
  - (ii) use and preparation of a burette to deliver accurately a measured volume of solution;
  - (iii) the dilution of solutions using volumetric apparatus;
  - (iv) the preparation of a standard solution from both solids and liquids;
  - (v) titration to an appropriate degree of accuracy.
- (b) A quantitative procedure to measure the volume of an evolved gas, collected either by up-turned measuring cylinder or gas syringe.
- (c) The determination of the percentage of water of crystallisation and the number of molecules of water of crystallisation in a hydrated salt.
- (d) The preparation of salts from acids and bases.
- (e) Simple test-tube reactions involving the following:
- (i) dilute acids on metals, bases, alkalis and carbonates;
  - (ii) the thermal decomposition of some group carbonates;
  - (iii) the identification of halides in solution;
  - (iv) halogen displacement reactions;
  - (v) the formation of precipitates.

### F322 Chains, Energy and Resources

- (a) Organic experiments exemplified by:
- (i) the preparation of ethanal from ethanol by oxidation with acidified dichromate;
  - (ii) the preparation of an organic liquid such as cyclohexene by dehydration of cyclohexanol or 1-bromobutane from butan-1-ol;
  - (iii) the reaction of alkenes with bromine water;
  - (iv) the reactions of primary, secondary and tertiary alcohols with acidified dichromate to show oxidation;
  - (v) the use of mass spectra and infrared data to establish the molecular mass of a compound and its functional groups.
- (b) Enthalpy experiments involving both direct and indirect determination of an enthalpy change of a reaction (such as the decomposition of calcium carbonate).
- (c) The production of a volume–time graph from a simple rate experiment.
- (d) Simple test-tube experiments to illustrate the effect of a change in concentration or temperature on the position of equilibrium.

## 5 Practical work for A2 Unit F326

This section provides a summary of the practical experience and skills that will be acquired by the use of the experiments suggested in the modules or by the use of equivalent Tasks devised by the centre.

**It should be noted that the practical experience acquired at AS may be tested at A2.**

### F324 Rings, Polymers and Analysis

- (a) The preparation and purification of a solid organic compound and the measurement of its melting point as a test for purity.
- (b) The preparation of an organic liquid compound (e.g. the preparation of an ester). It is also expected that candidates will be aware of the procedures involved in the purification and re-distillation at an appropriate temperature of the product obtained.
- (c) Qualitative tests to distinguish between:
- (i) saturated and unsaturated compounds using bromine water;
  - (ii) primary and tertiary alcohols using acidified potassium dichromate;
  - (iii) phenols and aliphatic alcohols using bromine;
  - (iv) carbonyl and other functional groups using 2,4-dinitrophenylhydrazine;
  - (v) aldehydes and ketones using Tollens' reagent;
  - (vi) acidic, neutral and basic compounds using indicators and sodium carbonate.
- (d) An experiment to illustrate the use and interpretation of thin-layer or paper chromatography.
- (e) The interpretation of IR, mass and NMR spectra (proton and carbon-13) (*Data Sheets will be allowed*).

### F325 Equilibria, Energetics and Elements

- (a) Rate experiments:
- (i) involving a measurement of an initial rate and the use of an appropriate graph to determine an order of reaction for a reagent;
  - (ii) requiring continuous monitoring and the use of an appropriate graph to determine the rate of reaction and the order of reaction for a reagent.
- (b) Candidates should be familiar with the procedures involved in an experiment to determine an equilibrium constant.
- (c) Experiments to illustrate enthalpy changes of solution and neutralisation.
- (d) Experiments to illustrate the use of electrode potentials to predict the likelihood of a reaction taking place. (e.g. simple test-tube experiments such as metal displacement reactions or simple redox processes).

- (e)** Test-tube experiments to illustrate:
- (i) the precipitation of transition metal hydroxides;
  - (ii) ligand exchange reactions;
  - (iii) simple redox reactions such as the interconversion of the oxidation states of vanadium.
- (f)** Redox titrations involving the use of  $\text{MnO}_4^-$ (aq) and  $\text{S}_2\text{O}_3^{2-}$ (aq).

# 6 Apparatus list for Units F323 and F326

## Unit F323

For each candidate, the following apparatus may be required to complete the assessed Tasks:

- Pipettes (10 cm<sup>3</sup> and 25 cm<sup>3</sup>)
- Pipette fillers
- One burette (50 cm<sup>3</sup>)
- One volumetric flask (250 cm<sup>3</sup>, 150 cm<sup>3</sup> or 100 cm<sup>3</sup>)
- Two conical flasks (250 cm<sup>3</sup>)
- One wash bottle
- Four measuring cylinders (250 cm<sup>3</sup>, 100 cm<sup>3</sup>, 50 cm<sup>3</sup> and 10 cm<sup>3</sup>)
- Two filter funnels
- Evaporating basin (at least 30 cm<sup>3</sup>)
- Beakers (400 cm<sup>3</sup>, 250 cm<sup>3</sup> and 100 cm<sup>3</sup>)
- Quickfit apparatus to carry out an organic preparation including distillation
- Plastic cup for use as a calorimeter
- Thermometer (−10 to +110 °C) or equivalent
- Stop clocks/watches reading to 1 s or better.
- Pipeclay triangle
- Porcelain crucible + lid
- Test-tubes and boiling tubes
- Test-tube holders
- Dropping pipettes
- Two stands and clamps
- Bunsen burner
- Balance reading to at least two decimal places
- Glass rods
- Heat proof mat
- Tripod and gauze

## Unit F326

In addition to the apparatus indicated in Unit F323 above, the following may also be required.

- Melting point apparatus or oil bath/thiele tubes
- Apparatus for filtration under reduced pressure
- Melting point tubes

### **Alternative apparatus for candidates eligible for access arrangements**

Advice about specialist equipment that may be suitable for candidates eligible for access arrangements (e.g. talking thermometers, talking scales, notched syringes) can be obtained from the RNIB ([www.rnib.org.uk](http://www.rnib.org.uk)) and other specialist disability organisations. Before using such equipment for an assessed task the awarding body should be contacted to ensure that it does not interfere with the competence standards being assessed.

# 7 Resources

## General resources

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There are many resources available to help teachers provide support to candidates. These include both books and websites.

The OCR website – [www.ocr.org.uk](http://www.ocr.org.uk) contains marked exemplar material from trials held in a number of centres.

Other useful websites are:

- the Royal Society of Chemistry at [www.rsc.org](http://www.rsc.org)
- the ASE at [www.schoolscience.co.uk](http://www.schoolscience.co.uk)
- Chemguide at [www.chemguide.co.uk](http://www.chemguide.co.uk)
- [www.practicalchemistry.org](http://www.practicalchemistry.org)
- [www.practicalchemistry.org/experiments/advanced/acid-base-reactions/topic-index.html](http://www.practicalchemistry.org/experiments/advanced/acid-base-reactions/topic-index.html)
- [www.creative-chemistry.org.uk/alevel/](http://www.creative-chemistry.org.uk/alevel/)
- [www.chemistry-videos.org.uk/chem%20clips/home.html](http://www.chemistry-videos.org.uk/chem%20clips/home.html)
- [www.avogadro.co.uk/chemist.htm](http://www.avogadro.co.uk/chemist.htm)
- [www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/redoxNew/redox.html](http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/redoxNew/redox.html)

## INSET

OCR runs INSET courses every year, primarily in the Autumn term, and these include sessions either wholly or partly to support internally assessed Tasks. More details about INSET provision are available at [www.ocr.org.uk](http://www.ocr.org.uk)

## Coursework consultancy

OCR offers a coursework consultancy service whereby centres can send up to four photocopies of marked work to OCR for commentary by a senior Moderator. If a centre wishes to make use of this service, work should be submitted to OCR no less than 8 weeks before the coursework submission date (15 May). The coursework enquiry form is available at [www.ocr.org.uk](http://www.ocr.org.uk) and on Interchange.

## 8 Health & Safety

Useful information can be found at [www.cleapss.org.uk](http://www.cleapss.org.uk)

Candidates are expected to be familiar with the standard hazard warnings illustrated below.



**Oxidising**



**Harmful**



**Highly  
Flammable**



**Corrosive**



**Toxic**



**Irritant**

In UK law, health and safety is the responsibility of the employer. For most establishments entering candidates for AS and Advanced GCE this is likely to be the local education authority or the governing body. Employees, i.e. teachers and lecturers, have a duty to cooperate with their employer on health and safety matters. Various regulations, but especially the COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999, require that before any activity involving a hazardous procedure or harmful micro-organisms is carried out, or hazardous chemicals are used or made, the employer must provide a risk assessment. A useful summary of the requirements for risk assessment in school or college science can be found at [www.ase.org.uk/htm/teacher\\_zone/safety\\_in\\_science\\_education.php](http://www.ase.org.uk/htm/teacher_zone/safety_in_science_education.php).

For members, the CLEAPSS® guide, *Managing Risk Assessment in Science*\* offers detailed advice. Most education employers have adopted a range of nationally available publications as the basis for their Model Risk Assessments. Those commonly used include:

- *Safety in Science Education*, DfEE, 1996, HMSO, ISBN 0 11 270915 X.

Now out of print but sections are available at

[www.ase.org.uk/htm/teacher\\_zone/safety\\_in\\_science\\_education.php](http://www.ase.org.uk/htm/teacher_zone/safety_in_science_education.php) ;

- *Topics in Safety*, 3rd edition, 2001, ASE ISBN 0 86357 316 9;
- *Safeguards in the School Laboratory*, 11th edition, 2006, ASE ISBN 978 0 86357 408 5;
- CLEAPSS® *Hazcards*, 2007 edition and later updates\*;
- CLEAPSS® *Laboratory Handbook*\*;
- *Hazardous Chemicals*, A Manual for Science Education, 1997, SSERC Limited

ISBN 0 9531776 0 2 (see [www.sserc.org.uk/public/hazcd/whats\\_new.htm](http://www.sserc.org.uk/public/hazcd/whats_new.htm) ).

Where an employer has adopted these or other publications as the basis of their model risk assessments, an individual school or college then has to review them, to see if there is a need to modify or adapt them in some way to suit the particular conditions of the establishment.

Such adaptations might include a reduced scale of working, deciding that the fume cupboard provision was inadequate or the skills of the candidates were insufficient to attempt particular activities safely. The significant findings of such risk assessment should then be recorded, for example on schemes of work, published teachers guides, work sheets, etc. There is no specific legal requirement that detailed risk assessment forms should be completed, although a few employers require this.

Where project work or individual investigations, sometimes linked to work-related activities, are included in specifications this may well lead to the use of novel procedures, chemicals or micro-organisms, which are not covered by the employer's model risk assessments. The employer should have given guidance on how to proceed in such cases. Often, for members, it will involve contacting CLEAPSS® (or, in Scotland, SSERC).

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\*These, and other CLEAPSS® publications, are on the CLEAPSS® Science Publications CD-ROM issued annually to members. Note that CLEAPSS® publications are only available to members. For more information about CLEAPSS® go to [www.cleapss.org.uk](http://www.cleapss.org.uk) . In Scotland, SSERC ([www.sserc.org.uk](http://www.sserc.org.uk) ) has a similar role to CLEAPSS® and there are some reciprocal arrangements.

# 9 Appendix 1 – Measurements

## Useful terms

**Accuracy** is a measure of the closeness of agreement between an individual test result and the accepted reference value. If a test result is **accurate**, it is in close agreement with the accepted reference value.

**Error** (of measurement) is the difference between an individual measurement and the **true** value (or accepted reference value) of the quantity being measured.

**Precision** is the closeness of agreement between independent measurements obtained under the same conditions. It depends only on the distribution of random errors (*i.e.* the spread of measurements) and does not relate to the true value.

**Uncertainty** is an estimate attached to a measurement which characterises the range of values within which the true value is asserted to lie. This is normally expressed as a range of values such as  $44.0 \pm 0.4$ .

**Reliability** is the opposite of uncertainty, *i.e.* if the uncertainty is great; the measurement is not very reliable.

## How accurate are measurements?

When using a digital measuring device (such as a modern top pan balance or ammeter),

- record *all* the digits shown.

When using a non-digital device (such as a ruler or a burette),

- record all the figures that are known for certain plus one that is estimated.

As a general rule, the uncertainty is often taken to be half a division on either side of the smallest unit on the scale you are using. However, the accuracy of measurements does also depend on the quality of the apparatus used, such as a balance, thermometer or glassware.

For example, a  $100 \text{ cm}^3$  measuring cylinder is graduated in divisions every  $1 \text{ cm}^3$ .

- A Class A measuring cylinder has a maximum error of half a division or  $0.5 \text{ cm}^3$
- A Class B measuring cylinder has a maximum error of a whole division or  $1 \text{ cm}^3$ .

Because of this variability, assessed Tasks will state the **maximum error** in any measurement that is being made.

## Examples of maximum errors

When glassware is manufactured there will always be a maximum error. This is usually marked on the glassware.

Some examples are shown below. Note that the actual maximum error on a particular item of glassware may differ from the values given below.

Volumetric or standard flask (Class B)

- A  $250 \text{ cm}^3$  volumetric flask has a maximum error of  $0.2 \text{ cm}^3$  or 0.08%.

Pipette (Class B)

- A 25 cm<sup>3</sup> pipette has a maximum error of 0.06 cm<sup>3</sup> or 0.24%.

Burette (Class B)

- A pipette has a maximum error of 0.05 cm<sup>3</sup> in each measurement.

### Some examples

The significance of the maximum error in a measurement depends upon how large a quantity is being measured. It is useful to quantify this error as a percentage error.

$$\text{Percentage error} = \frac{\text{maximum error}}{\text{quantity measured}} \times 100\%$$

For example, a two-decimal place balance may have a maximum error of 0.005 g.  
For a mass measurement of 2.56 g,

- percentage error =  $\frac{0.005}{2.56} \times 100\% = 0.20\%$
- For a mass measurement of 0.12 g, the percentage error is much greater:

$$\text{Percentage error} = \frac{0.005}{0.12} \times 100\% = 4.2\%$$

### Multiple measurements

For multiple measurements using the same two-decimal place balance, there will be a maximum error of 0.005 g for each measurement.

For two mass measurements that give a resultant mass by difference, there are two maximum errors:

$$\text{Percentage error} = \frac{2 \times \text{maximum error in each measurement}}{\text{quantity measured}} \times 100\%$$

For example, using the same two-decimal place balance,

Mass of crucible + crystals before heat = 23.45 g	maximum error = 0.005 g
Mass of crucible + crystals after heat = 23.21 g	maximum error = 0.005 g
Mass lost = 0.23 g	maximum overall error = 2 x 0.005 g

There is a negligible percentage error in each mass measurement but the overall error in mass loss is much greater:

$$\text{Percentage error in mass loss} = \frac{2 \times 0.005}{0.23} \times 100\% = 4.3\%$$

### Reading burettes

A burette is graduated in divisions every 0.1 cm<sup>3</sup>.

A burette is a non-digital device, so we record all figures that are known for certain plus one that is estimated.

Using the half-division rule, the estimation is one of 0.05 cm<sup>3</sup>. We therefore record burette measurements to two decimal places with the last figure either '0' or '5'.

The maximum error in each measurement = 0.05 cm<sup>3</sup>.

The overall maximum error in any volume measured always comes from two measurements, so the overall maximum error =  $2 \times 0.05 \text{ cm}^3 = 0.1 \text{ cm}^3$ .

In a titration, a burette will typically deliver about  $25 \text{ cm}^3$  so the percentage error is small.

- Percentage error =  $\frac{2 \times 0.05}{25.00} \times 100\% = 0.4\%$

For small volumes, the percentage error becomes more significant

For delivery of  $2.50 \text{ cm}^3$ ,

- percentage error =  $\frac{2 \times 0.05}{2.50} \times 100\% = 4\%$

## Recording volumes during titrations

As shown above, each burette measurements should be recorded to two decimal places with the last figure either '0' or '5'.

During a titration, it is expected that students will record both initial and final burette readings from which a titre is calculated by difference. It is usual practice to record titration results in a table of the type shown below.

	trial	1	2	3
final burette reading / $\text{cm}^3$				
initial burette reading / $\text{cm}^3$				
titre / $\text{cm}^3$				
titres used to calculate mean (tick)				
mean titre / $\text{cm}^3$				

When recording the titre, it is normal practice to use two decimal places. This is what will be expected within the assessment Tasks.

## Mean titres

When recording a mean titre, is usual practice to take an average of the concordant titres, *i.e.* those that agree to within  $0.10 \text{ cm}^3$ . Where this is not possible, the two titres that have the closest agreement should be used.

For example, three recorded titres are  $25.80 \text{ cm}^3$ ,  $25.30 \text{ cm}^3$  and  $25.20 \text{ cm}^3$ .

The mean titre is the average of the 2nd and 3rd titres which agree to within  $0.1 \text{ cm}^3$ .

- The mean titre is  $\frac{25.30 + 25.20}{2} \text{ cm}^3 = 25.25 \text{ cm}^3$

The overall maximum error is  $2 \times 0.05 = 0.1 \text{ cm}^3$ .

There is a case for arguing that the accumulated errors indicate that one decimal place is more appropriate but this should **not** be used. The maximum error is the worst-case scenario and it is

likely that the actual titre will in reality be more accurate than one decimal place.

A student obtaining concordant titres within  $0.05 \text{ cm}^3$  of one another may encounter a problem when calculating the mean titre. For example, a student may obtain three recorded titres of  $25.80 \text{ cm}^3$ ,  $25.25 \text{ cm}^3$  and  $25.20 \text{ cm}^3$ .

$$\text{The mean titre is } \frac{25.25 + 25.20}{2} \text{ cm}^3 = 25.225 \text{ cm}^3$$

This mean titre has a value that is more accurate than the burette can measure. The value of  $25.225 \text{ cm}^3$  should more correctly be 'rounded' to  $25.25 \text{ cm}^3$ .

It would seem very unfair not to credit a mean titre of  $25.225 \text{ cm}^3$  in this case, especially as this student has carried out the titration better than the first student.

### What is acceptable in assessed Tasks?

As there are clearly problems with both the accumulated errors argument (leading to a one-decimal place titre) and titres that differ by  $0.05 \text{ cm}^3$  (leading to a three-decimal place mean titre), the Mark Schemes of assessment Tasks will allow some licence for what is acceptable in the calculation of a mean titre.

- For example, the mean of two titres of  $25.25 \text{ cm}^3$  and  $25.20 \text{ cm}^3$  will be allowed as 25.2, 25.20, 25.25 or  $25.225 \text{ cm}^3$ .
- These values are not all equally valid but the policy will be to give the student the benefit of the doubt so long as the mean has been calculated from the appropriate values.

### How many significant figures should be used?

The result of a calculation that involves measured quantities cannot be more certain than the *least* certain of the information that is used. So the result should contain the same number of significant figures as the measurement that has the *smallest* number of significant figures.

A common mistake by students is to simply copy down the final answer from the display of a calculator. This often has far more significant figures than the measurements justify.

### Rounding off

When rounding off a number that has more significant figures than are justified (as in the example above), if the last figure is between 5 and 9 inclusive round up; if it is between 0 and 4 inclusive round down.

For example, the number 350.99 rounded to:

4 sig fig is 351.0  
3 sig fig is 351  
2 sig fig is 350  
1 sig fig is 400

Notice that when rounding you only look at the one figure beyond the number of figures to which you are rounding, *i.e.* to round to three sig fig you only look at the fourth figure.

## How do we know the number of significant figures?

In the example above, 351 has been rounded to the 2 sig fig value of 350. However, if seen in isolation, it would be impossible to know whether the final zero in 350 is significant (and the value to 3 sig figs) or insignificant (and the value to 2 sig figs).

In such cases, standard form should be used and is unambiguous:

- $3.5 \times 10^2$  is to 2 sig figs
- $3.50 \times 10^2$  is to 3 sig figs

## When to round off

It is important to be careful when rounding off in a calculation with two or more steps.

- Rounding off should be left until the very end of the calculation.
- Rounding off after each step, and using this rounded figure as the starting figure for the next step, is likely to make a difference to the final answer. This introduces a **rounding error**.

***Students often introduce rounding errors in multi-step calculations.***

### Example

When 6.074 g of a carbonate is reacted with 50.0 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> HCl(aq) (which is an excess), a temperature rise of 5.5 °C is obtained. The specific heat capacity of the solution is 4.18 J g<sup>-1</sup> K<sup>-1</sup>,

The heat produced =  $50.0 \times 4.18 \times 5.5$  for which a calculator gives 1149.5 J = 1.1495 kJ

*Since the least certain measurement (the temperature rise) is only to 2 significant figures the answer should also be quoted to 2 significant figures.*

Therefore, the heat produced = 1.1 kJ

- *It should be noted however, that if this figure is to be used subsequently to calculate the enthalpy change per mole then the rounding off should **not** be applied until the final answer has been obtained.*

For example, if the carbonate has a molar mass of 84.3 g mol<sup>-1</sup>, the enthalpy change per mole of carbonate can be calculated from the value above.

Using the calculator value of 1.1495 kJ for the heat produced,

- enthalpy per mole = 15.95371255 kJ mol<sup>-1</sup>.
- rounding to 2 sig figs gives 16 kJ mol<sup>-1</sup>

Using the rounded value of 1.1 kJ for the heat produced,

- enthalpy per mole = 15.26671057 kJ mol<sup>-1</sup>.
- rounding to 2 sig figs gives 15 kJ mol<sup>-1</sup> and we have a 'rounding error'.

## Errors in procedure

The accuracy of a final result also depends on the procedure used. For example, in an enthalpy experiment, the measurement of a temperature change may be precise but there may be large heat losses to the surroundings which affect the accuracy of overall result.

## Anomalous readings

Where an experiment uses repeated measurements of the same quantity, such as repeated titration readings, anomalous readings should be identified. If a titre is clearly outside the range of all other readings, it can be judged as being anomalous and should be ignored when the mean titre is calculated.

Similarly, if a plotted graph reveals that a value is anomalous, then it should be ignored.

## References

The Royal Society of Chemistry has produced several very helpful documents on measurements and errors, see:

[www.rsc.org/education/teachers/learnnet/pdf/learnnet/RSCmeasurements\\_teacher.pdf](http://www.rsc.org/education/teachers/learnnet/pdf/learnnet/RSCmeasurements_teacher.pdf)

[www.rsc.org/pdf/amc/brief13.pdf](http://www.rsc.org/pdf/amc/brief13.pdf)

# 10 Appendix 2 – Interchange Help Sheet

## Questions and answers

### Where can I get the Practical Skills Assessment Tasks?

The live Tasks must be downloaded from Interchange, OCR's secure web portal. Printed copies will not be sent to Centres. Do not confuse the live assessment Tasks on Interchange with the Specimen Assessment Materials (SAMs) on the public OCR website – the SAMs must not be used for live assessment.

### What is the web address for Interchange?

<https://interchange.ocr.org.uk> (Note: do not add 'www.' before the word 'interchange'.)

### How do I obtain a username and password to log in to Interchange?

If your Centre is not already registered to use Interchange, your Examinations Officer will need to follow the information about how to register given in the Appendices of the GCE specifications and in the subject specific Practical Skills Handbook. Once registered, your Examinations Officer (or whoever holds the role of 'Centre Administrator') must either set you up as a new user with the role of 'Science Coordinator' to allow you to download the Tasks, or (less preferably) assign the role of 'Science Coordinator' to themselves so that they can download the Tasks and pass them to you.

### How does my Examinations Officer set me up as a new user with the role of 'Science Coordinator'?

Your Examinations Officer (or whoever holds the role of 'Centre Administrator') should follow these steps in Interchange:

1. Hover the mouse cursor over 'Admin' in the left-hand menu, and then select 'Manage centre users' from the pop-up menu that appears. A list of all current users at your Centre will be loaded.
2. Click the 'Add New User' link (above the list of current users).
3. Enter user details.
4. Select the 'Roles' tab.
5. Select the role of 'Science Co-ordinator' on the left-hand side of the screen.
6. Click the '>' button. The 'Science Co-ordinator' role moves across to the right-hand side of the screen.
7. Click the 'User' tab.
8. Click 'Add'.

You will receive notification on screen of whether the new user was added successfully or not. Errors are indicated by a red asterisk (\*) and are detailed on screen. *Please note that it usually takes approximately 20 minutes for the new user to be able to access Interchange.*

### After logging in to Interchange, where can I find the Tasks?

Hover the mouse cursor over 'Coursework and tests' in the left-hand menu, and then select 'Science co-ordinator materials' from the pop-up menu that appears. Near the top of the new page that opens click the 'GCE AS/A2' link. Finally, select the appropriate specification name.

### **I don't have the 'Coursework and tests' and/or 'Science co-ordinator materials' options in the left-hand menu...**

You need to be given the role of 'Science Co-ordinator'. Your Examinations Officer (or whoever holds the role of 'Centre Administrator') must assign the role of 'Science Co-ordinator' to you, as follows: step 1 above, click on the relevant username, steps 4 – 7 above, then click 'Update'.

### **When I click on the specification name nothing happens / I get an error message / I get a warning about blocked content...**

When you click on a subject heading (or click on the 'More detail...' link to the right of the heading), the rest of the page should slide down to reveal the Tasks and other materials available to download for the specification you selected. This works using Javascript, so your browser may alert you to 'active content' or 'blocked content'. Please ensure that you select the appropriate option to allow all content to run. In Internet Explorer, the alert may appear as a pale yellow bar at the top of the page; you will need to click on the pale yellow bar and select 'Allow blocked content'.

Check also that Javascript is enabled in your browser. In Internet Explorer, go to the 'Tools' menu and select 'Internet Options'; select the 'Advanced' tab on the far right; scroll down the list of check boxes to the coffee cup icon next to the heading 'Java (Sun)'; ensure that the 'Use Java for <applet>' check box (or similar) is ticked; click the 'OK' button; close Internet Explorer and then re-open it and log back in to Interchange. You should only ever have to do this once, unless you move to a different computer.

### **How do I download the Task 'zip' files?**

Click on the Task that you want to download. If you are prompted whether to 'Open' or 'Save' the file, select 'Save'. You will be prompted for a location to which to save the file - select an appropriate location on your hard drive or USB stick. It is your responsibility to keep the Tasks strictly confidential after download, so choose a location that only you have access to. Remember that Tasks can only be used for assessment in the period stated on the Task cover (e.g. between 1 June 2009 and 14 May 2010). For future sessions, new Tasks need to be downloaded from Interchange.

### **What is a 'zip' file? / How to I get the Tasks from the 'zip' file?**

The 'zip' file for each Task is a single file that has several PDF documents compressed inside it, namely the candidates' Task sheet, the Instructions for Teachers and Technicians and the Mark Scheme, together with any additional files pertinent to the Task. You will need to extract the compressed PDF files before you can use them.

In Windows XP and Windows Vista you can look inside the 'zip' file by double-clicking it, or by right-clicking it and selecting 'Explore'; once inside the 'zip', click on the 'File' menu, and then select 'Extract all'. If you use an older version of Windows (e.g. 95, 98, 2000, ME, or NT) you will need to download and use third-party 'zip' extractor software such as WinZip or PKZip to extract the files.

Mac OS X version 10.3 ('Panther') and later releases have built-in support for 'zip' files. If you are using an older release, or if you experience difficulty extracting the PDF documents from the 'zip' file, try downloading and using third-party 'zip' extractor software such as StuffIt Expander to extract the files.

### **I get an error message saying that the 'zip' file is corrupt...**

OCR has tested the files to ensure that they can all be downloaded successfully. If you are having problems with one of the files you have downloaded, delete the file and download it again or try downloading it on a different computer. Also check with your IT administrator to ensure that a virus scanner or firewall on your Centre's network is not disrupting the file.

**Some of the Tasks / Mark Schemes are missing...**

Tasks for all GCE science specifications will be uploaded from 1st June each year. The previous year's Tasks will have been taken down during May, and must not be used for assessment in the current session. If all of the Tasks are not available the first time you log in, check back in subsequent weeks for the latest additions, or register for e-mail updates to be alerted when new Tasks are uploaded (see below). Mark Schemes for all of the Tasks will be uploaded from 1st September each year.

**Do I have to keep logging in to Interchange to check for updates?**

No. Just above the Tasks for each specification is a notice about 'e-mail updates'. To be notified by e-mail when changes are made to the Task pages, send an e-mail to [GCEsciencetasks@ocr.org.uk](mailto:GCEsciencetasks@ocr.org.uk) including your name, Centre number and Centre name, and state the name of the specification(s) for which you wish to receive updates in the subject line.

**Is there a way to see titles/summaries the Tasks without downloading them all?**

The document called 'Getting Started' in the 'Support Materials' box on each specification page gives titles and summaries for all Tasks that are available for assessment in the current session. Click the 'Getting Started' link to download the document.

**1** <https://interchange.ocr.org.uk>  
(Do not add "www." before "interchange")

**2**

**3**

**4**

**5**

**6**