Resource provided as an example of good practice by Ashley Law, Yarm School, Yarm.

Yarm School Chemistry Department

Practical work is a key component of your A-level. Your understanding of key practical activities and techniques will be tested on the written papers and you will be assessed by your teacher on five aspects (CPAC).

The purpose of a lab book

A lab book is a live document which is a complete record of everything that has been done in the laboratory.

A lab book is a:

- source of data that can be used later by the experimenter or others
- complete record of what has been done so that experiments could be understood or repeated by a competent scientist at some point in the future
- tool that supports sound thinking and helps experimenters to question their results to ensure that their interpretation is the same one that others would come to
- record of why experiments were done.

Style

Notes should be recorded as experiments are taking place. They should not be a "neat" record written at a later date from scraps of paper. However, they should be written clearly, in legible writing and in language which can be understood by others.

There should be no blank spaces. Mistakes should be crossed out and re-written. Numbers should not be overwritten, erased, nor should Tippex be used. Pencil should not be used for anything other than graphs and diagrams.

Each page should be dated

Additional Sheets

Worksheets, graphs, printed information, photographs and even flat "data" such as chromatograms or TLC plates can all be stuck into a lab book. They should not cover up any information so that photocopying the page shows all information in one go. Anything glued in should lie flat and not be folded.

Content

Generally, lab books will contain:

- title and date of experiment
- notes on what the objectives of the experiment
- notes on the method, including all details (eg temperatures, volumes, settings of pieces of equipment) with justification where necessary
- sketches of how equipment has been set up can be helpful and photographs pasted in are also acceptable
- data and observations input to tables (or similar) while carrying out the experiment
- calculations – annotated to show thinking
- graphs and charts
- summary, discussions and conclusions
- cross-references to earlier data and references to external information.
- notes made following teacher feedback

Chemistry apparatus and techniques  All

	Apparatus and techniques
AT a	Use appropriate apparatus to record a range of measurements (to include mass, time, volume of liquids and gases, temperature)
AT b	Use water bath or electric heater or sand bath for heating
AT c	Measure pH using pH charts, or pH meter, or pH probe on a data logger
AT d	Use laboratory apparatus for a variety of experimental techniques including: • titration, using burette and pipette • distillation and heating under reflux, including setting up glassware using retort stand and clamps • qualitative tests for ions and organic functional groups • filtration, including use of fluted filter paper, or filtration under reduced pressure
AT e	Use volumetric flask, including accurate technique for making up a standard solution
AT f	Use acid–base indicators in titrations of weak/strong acids with weak/strong alkalis
AT g	Purify: • a solid product by recrystallisation • a liquid product, including use of separating funnel
AT h	Use melting point apparatus
AT i	Use thin-layer or paper chromatography
AT j	Set up electrochemical cells and measuring voltages
AT k	Safely and carefully handle solids and liquids, including corrosive, irritant, flammable and toxic substances
AT l	Measure rates of reaction by at least two different methods, for example: • an initial rate method such as a clock reaction • a continuous monitoring method

Chemistry required activities (1-6 AS), (1-12 A-level) 

Required activity	Apparatus and technique reference
1. Make up a volumetric solution and carry out a simple acid–base titration	a, d, e, k
2. Measurement of an enthalpy change	a, d, k
3. Investigation of how the rate of a reaction changes with temperature	a, b, k
4. Carry out simple test-tube reactions to identify: • cations – Group 2, NH_4^+ • anions – Group 7 (halide ions), OH^-, CO_3^{2-}, SO_4^{2-}	b, d, k
5. Distillation of a product from a reaction	b, d, k
6. Tests for alcohol, aldehyde, alkene and carboxylic acid	b, c, d, k
7. Measuring the rate of reaction: • by an initial rate method • by a continuous monitoring method	a, k, l a, k, l
8. Measuring the EMF of an electrochemical cell	j, k
9. Investigate how pH changes when a weak acid reacts with a strong base and when a strong acid reacts with a weak base	a, c, d, f, k
10. Preparation of: • a pure organic solid and test of its purity • a pure organic liquid	a, b, d, g, h, k b, d, g, k
11. Carry out simple test-tube reactions to identify transition metal ions in aqueous solution	b, c, d, k
12. Separation of species by thin-layer chromatography	i, k

Common Practical Assessment Criteria in A-level Chemistry

The following table shows a list of practical competencies that will be assessed during this practical course.
In order to achieve a pass, you will need to complete a minimum of 12 practical activities and *consistently and routinely* exhibit the competencies listed in the table before the completion of the A-level course. **You must be able to provide evidence of your competency so do not lose your practical booklets and keep them in good order!**

Competency	Practical mastery
1. Follows written procedures	a. Correctly follows instructions to carry out experimental techniques or procedures.
2. Applies investigative approaches and methods when using instruments and equipment	a. Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting. b. Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments when necessary. c. Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled. d. Selects appropriate equipment and measurement strategies in order to
3. Safely uses a range of practical equipment and materials	a. Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field. b. Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.
4. Makes and records observations	a. Makes accurate observations relevant to the experimental or investigative procedure. b. Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.
5. Researches, references and reports	a. Uses appropriate software and/or tools to process data, carry out research and report findings. b. Cites sources of information demonstrating that research has taken place, supporting planning and conclusions.

Date	Practical	Practical Competencies										
		1a	2a	2b	2c	2d	3a	3b	4a	4b	5a	5b

Date	Practical	Practical Competencies										
		1a	2a	2b	2c	2d	3a	3b	4a	4b	5a	5b