Assessment of practical work

The course you are following has been designed to help you to develop the skills, knowledge and understanding needed to succeed with hands-on practical chemistry. If you enter for AS examinations, your practical skills will only be assessed in the written examinations. However, throughout a full A Level course, your teacher has to assess those aspects of practical work that cannot be tested in written papers.

In the laboratory and in examinations, you are expected to solve problems in a practical context by applying your knowledge of chemicals, experimental procedures and explanatory theories.

Practical skills to be assessed in AS (and A Level) examination papers include your ability to:

* comment on experimental design and evaluate scientific methods
* identify variables, including those that must be controlled
* describe and explain how to use a range of instruments, equipment and techniques
* present data in appropriate ways including the use of graphs, charts and tables
* process and analyse data presented in a variety of formats using appropriate mathematical skills
* evaluate results, taking into account margins of error, accuracy and precision of data
* draw conclusions with reference to measurement uncertainties and errors.

Practical skills that will be assessed by teachers throughout the full A Level course include your ability to:

* follow written instructions
* safely and correctly use a range of instruments, equipment and techniques
* make and record observations
* keep appropriate records of experimental activities
* present information and data in a scientific way
* use appropriate software and tools to process data and report findings
* use online and offline research skills, making use of sources such as websites, textbooks and other printed scientific sources of information
* correctly cite sources of information.

Core practicals

During the full A Level course you have to carry out 16 Core practicals. Your understanding of the practical techniques and skills involved will be assessed in the written examinations. Eight of these Core practicals feature in the AS course. A version of each of these Core practicals is described in the main chapters of this textbook, so that you can practise explaining the procedures, interpreting results, drawing conclusions and evaluating the outcomes.

Each Core practical introduces you to the correct ways of using laboratory apparatus and illustrates a particular experimental technique. In all of the Core practicals you are also expected to show that you can work safely and effectively (see Practical skills sheet 2). The eight Core practicals in the AS course are as follows.

1 Measuring the molar volume of a gas (see Section 5.4 and Practical skills sheet 4): in this practical you have to make accurate measurements of mass or length, and volume in order to achieve good results.

2 Preparation of a standard solution from a solid acid (see Section 5.6 and Practical skills sheets 4 and 6): this practical shows how a balance and graduated flask can be used to make up a solution with a concentration that is accurately known.

3 Finding the concentration of a solution of hydrochloric acid (see Section 5.9 and Practical skills sheet 6): this practical introduces the titration procedure based on two items of apparatus that can be used to measure volumes of solutions very precisely.

4 Investigation of the rates of hydrolysis of halogenoalkanes (see Section 6.3.4 and Practical skills sheet 4): this practical illustrates the importance of controlling variables in investigations and involves heating and temperature control.

5 The oxidation of ethanol (see Section 6.3.8 and Practical skills sheet 8): this synthesis of an organic liquid involves heating flammable substances safely, separating the product from the reaction mixture and checking on the yield and purity of the final product.

6 Chlorination of 2-methylpropan-2-ol with concentrated hydrochloric acid (see Section 6.3.8 and Practical skills sheet 8): this synthesis of an organic liquid involves the use of a tap funnel for purifying and separating the product as well checking on the yield and purity of the final product.

7 Analysis of some inorganic and organic unknowns (see Sections 5.11 and 7.2, and Practical skills sheets 7 and 9): in these analyses you have to carry out a series of tests safely, make accurate observations and then use your knowledge of reactions to interpret the tests.

8 To determine the enthalpy change of a reaction using Hess’s Law (see Section 8.5 and Practical skills sheet 10): this practical involves the use of a simple calorimeter and requires small temperature changes to be measured accurately, while minimising sources of error.