**Recording work 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.

Many lab books are used in industry as a source of data, and so should be written in indelible ink.

To ensure that an observer can be confident that all data are included when a lab book is examined, 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**

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. 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.

This list and its order are not prescriptive. Many experiments change as they are set up and trials run. Often a method will be given, then some data, then a brief mention of changes that were necessary, then more data and so on.

## Significant figures

Data should be written in tables to the same number of significant figures. This number should be determined by the resolution of the device being used to measure the data or the uncertainty in measurement. For example, a sample labelled as “1 mol dm–3 acid” should not be recorded in a table of results as 1.0 mol dm–3.

There is sometimes confusion over the number of significant figures when readings cross multiples of 10. Changing the number of decimal places across a power of ten retains the number of significant figures **but changes the accuracy.** The same number of decimal places should therefore generally be used, as illustrated below.

|  |  |  |
| --- | --- | --- |
| 0.97 |  | 99.7 |
| 0.98 |  | 99.8 |
| 0.99 |  | 99.9 |
| 1.00 |  | 100.0 |
| 1.10 |  | 101.0 |

It is good practice to write down all digits showing on a digital meter.

Calculated quantities should be shown to the number of significant figures of the data with the least number of significant figures.

Example:

Calculate the size of an object if the magnification of a photo is ×25 and it is measured to be 24.6 mm on the photo.

$size of real object= \frac{size of image}{magnification}$

$size of real object= \frac{24.6 ×10^{-3}}{25}$

$size of real object= 9.8 × 10^{-4}$

Note that the size of the real object can only be quoted to two significant figures as the magnification is only quoted to two significant figures.

Equipment measuring to half a unit (eg a thermometer measuring to 0.5 °C) should have measurements recorded to one decimal place (eg 1.0 °C, 2.5 °C). The uncertainty in these measurements would be ±0.25, but this would be rounded to the same number of decimal places (giving measurements quoted with uncertainty of (1.0 ± 0.3) °C etc).