

APPENDIX B

Mistakes, Errors, Accuracy and Precision

I. Mistake

A mistake is an unintentional action of the person performing the experimental work.

II. Error

An error accounts for the range of values obtained from successive experimentally determined values of the same quantity, even though there was no mistake in any of the measurements.

Errors can be of two types:

1. Systematic Errors

Systematic errors affect the **accuracy** of a measurement, that is, the agreement between an experimentally determined value of a quantity and its true value.

A systematic error causes an experimentally determined quantity to be consistently either too large or too small. A systematic error is usually caused by faulty measuring devices or the consistent incorrect use of a piece of equipment.

Examples:

- Absorbance readings on a spectrophotometer which has not been zeroed prior to taking the absorbance measurements.
- Mass readings on an analytical balance that has not been calibrated.
- pH readings taken with a pH meter calibrated for the inappropriate pH range.

2. Random Errors

Random errors occur when a measuring device is consistently correctly used to take the same measurement, but the results obtained differ over a narrow or a wide range.

The effect of the random errors on the experimentally determined value of a specific quantity can be minimized by obtaining a large number of values and rejecting the ones that are very different from the calculated mean value.

Random errors affect the **precision** of a measurement, that is the dispersion of, or the closeness of the agreement between successive measurements of the same quantity.

The dispersion in a set of measurements is usually expressed in terms of the standard deviation.

Bibliography:

R.A.D. Wentworth "Experiments in General Chemistry", Sixth Edition