Types & Sources of Experimental Error

Experimental errors are NOT mistakes or miscalculations! These types of errors can be eliminated by repeating the experiment and performing the experiment correctly.

Experimental errors are inherent in the measurement process and cannot be eliminated by repeating the experiment no matter how carefully it is performed.

There are two types of experimental errors: *systematic errors* and *random errors*

  Systematic Errors ~ affect the accuracy of a measurement. They are sometimes referred to as "one-sided" errors. These errors may occur due to poor calibration, poorly maintained instruments, or misreading of instruments (parallax). Measurements will be consistently high or consistently low compared to the true or accepted value. Cannot be easily analyzed statistically.

  Random Errors ~ affect the precision of a measurement. They are sometimes referred to as "two-sided" errors. The results may fluctuate above and below the true or accepted value. The precision can be improved by repeated measurements.   Random errors can be analyzed by statistical methods.

Calculating Experimental Error
When the results of an experiment are reported, the accuracy & precision of the results must be indicated. There are several ways that this can be done:
• Significant Digits - indicate the precision of the measuring instrument

• Percent Error

• Percent Difference

• Mean & Standard Deviation

What about Sig Digs and conversion factors?