Chemical and Biological Engineering I

Estimating the Number of Significant Figures

(adapted from http://www.chem.sc.edu/faculty/morgan/resources/sigfigs)

Rules for determining the number of significant figures in a measured quantity:

(1) All nonzero digits are significant:

1.234 g has 4 significant figures,

1.2 g has 2 significant figures.

(2) Zeroes between nonzero digits are significant:

1002 kg has 4 significant figures,

3.07 mL has 3 significant figures.

(3) Leading zeros to the left of the first nonzero digits are not significant; such zeroes merely indicate the position of the decimal point:

0.001 °C has only 1 significant figure,

0.012 g has 2 significant figures.

(4) Trailing zeroes that are also to the right of a decimal point in a number are significant:

0.0230 mL has 3 significant figures,

0.20 g has 2 significant figures.

(5) When a number ends in zeroes that are not to the right of a decimal point, the zeroes are not necessarily significant:

190 miles may be 2 or 3 significant figures,

50,600 calories may be 3, 4, or 5 significant figures.

The potential ambiguity in the last rule can be avoided by the use of standard exponential, or "scientific," notation. For example, depending on whether the number of significant figures is 3, 4, or 5, we would write 50,600 calories as

5.06×10^4 calories (3 significant figures)

5.060×10^4 calories (4 significant figures), or

5.0600×10^4 calories (5 significant figures).

By writing a number in scientific notation, the number of significant figures is clearly indicated by the number of numerical figures in the 'digit' term as shown by these examples. This approach is a reasonable convention to follow.