APPENDIX A

Significant Figures in Calculations

There are several distinct and specific rules, concerning the proper use of significant figures, which differ from each other, depending on the type of calculation performed.

However, there is one general guiding principle that governs all the specific rules and calculations:

The precision of an answer to a calculation cannot exceed the precision of the measured quantities used in the calculation.

1. **Multiplication and Division**

When measured quantities are **multiplied** or **divided**, there should be as many **significant figures in the answer** as there are in the measurement with the least number of significant figures

Example:

3 Sig Figs

$$\frac{1.95}{\mathbf{0.30} \times 10^{-3}\ K^{-1}} = -\mathbf{6.5} \times 10^{3}\ K$$

2 Sig Figs — 2 Sig Figs

2. **Addition and Subtraction**

When measured quantities are **added** or **subtracted**, there should be the same number of **decimal places in the answer** as there are in the measurement with the least number of decimal places.

Example:

$161.\mathbf{4} - 1.74 = 159.\mathbf{7}$

1 decimal — 2 decimals — 1 decimal

$$\begin{array}{r} 161.\mathbf{4} - \\ 1.74 \\ \hline 159.66 \end{array} \rightarrow \underline{\mathbf{159.7}}$$

3. **Logarithms and Antilogarithms**

a. When taking the logarithm of a number, the number of decimals in the answer should be the same as the number of significant figures whose logarithm is being calculated.

Example:

$\log(\mathbf{3.6} \times 10^{-12}) = -11.\mathbf{44}$

2 Sig Figs — **2 decimals**

b. When taking the antilogarithm of a number, the number of significant figures in the answer should be the same as the number of decimal places whose antilogarithm is calculated.

Example:

$\text{antilog}(-11.\mathbf{44}) = \mathbf{3.6} \times 10^{-12}$

2 decimals — **2 Sig Figs**

4. **Exact Numbers**

Any number whose value is known exactly will not affect the number of significant figures in a calculated result.

Bibliography:

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