Graphing Representation of Data
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Introduction

You may wonder, why use graphing in chemistry?

Scientific results and data are always accumulated in a laboratory setting but are only the backbone to the understanding of science. The ability to express and analyze the results is how scientific fields continue to progress generation after generation. Running an experiment correctly is critical, but those experiments do not mean anything unless that collected data is processed, explained and defended. Data handling is the body of a scientific text and must give us answers positive or negative to a specific problem or lend support to a hypothesis.

Most often, this data is numerical in form and must be dealt with by a combination of mathematical, graphical and statistical methods to allow for reasonable and, more importantly, reproducible results. Frequently the goal of an experiment is to find the relationship between two variables such as mass and volume, pressure and volume, time and temperature, etc. As one variable changes, so does the other. Graphing is a useful way to visualize and describe these relationships. Because the use of graphs is so common in the sciences, it is important that you know how to construct and interpret graphs.

The handling of data has become easier with the development of computer programs such as Excel and spreadsheets replacing hand drawing. Spreadsheets are as useful for handling numbers as word processors are for handling words. Excel also allows for statistical analyses and a variety of graphical representations.

One often hears the phrase, “a picture is worth a thousand words.” This is also true in science. Numerical data can be expressed in tables and paragraphs, but a majority of the time a picture would be more helpful. In science, pictures are better known as graphs. Scientists use graphs as comparison tools but most importantly as a method of determining unknowns. In most cases, known mathematical expressions are rearranged in the form of a straight line, $y = mx + b$, graphed and then the slope and y-intercept are determined.

Statistical analysis is also important in expressing the reliability of the data being presented. Statistics can be considered an exact treatment of uncertainty.
Task

In this exercise, you will be using data provided to draw graphs manually and with Excel software. Go over the process of drawing graphs using the two methods. You can use any reference, textbook or the Internet to look up the information before going to lab. Make sure to have a few sharp fine tip pencils, erasers and extra graph paper in case you need to redo any graph.

Summary of the steps in preparing a graph:
- Determine the dependent and independent variables; x-y axes
- Determine the range and the scale for each variable
- Determine the starting point for each coordinate
- Draw a smooth line using a fine tip pencil through the plotted points
- Label each axis and title the graph
- Read a graph and extract data for points between the experimental data points and infer information beyond the range of the data plotted