Graphing Using Excel

This exercise shows you how to handle Beer’s Law and kinetics data using Excel.

Beer’s Law

Type in [K2CrO4] in the A1 cell (x-axis) and Absorbance in the B1 cell (y-axis). Enter the data for concentration and absorbance.

Highlight the concentration and absorbance columns and click on Insert on the top menu and click on Chart on the drop down menu.
Click on the **xy scatter** option and click **Finish**.
Right click in the graph area and click on **Chart Options**. You can remove the **Legend**, add gridlines, **Graph Title**, and **labels** for the x and y axes. Then click **OK**.
By clicking in the graph area and using the cursor you can enlarge the graph.
Click on Chart in the top menu and click on the Add Trendline option. This will put in the linear regression line or best fit straight line through the data points.
### Beer's Law

<table>
<thead>
<tr>
<th>[K$_2$Cr$_2$O$_7$], M</th>
<th>Absorbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>0.100</td>
<td>0.145</td>
</tr>
<tr>
<td>0.200</td>
<td>0.255</td>
</tr>
<tr>
<td>0.300</td>
<td>0.415</td>
</tr>
<tr>
<td>0.400</td>
<td>0.525</td>
</tr>
</tbody>
</table>

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**Absorbance**

**[K$_2$Cr$_2$O$_7$], M**
Click on Automatic, Display equation on chart, and Display R-squared value on chart (how well the values correlate to a straight line) then click OK.
Beer's Law

\[ y = 1.32x + 0.004 \]

\[ R^2 = 0.993 \]

Absorbance

[\text{[K2Cr2O4]}, \text{M}]
Kinetics

Two experiments were done to obtain absorbance versus time data for the reaction:

$$2\text{N}_2\text{O}_5(g) \rightarrow 4\text{NO}_2(g) + \text{O}_2(g)$$

The data were entered into Excel as shown. Columns A and B are experiment one and columns C and D are experiment two.

Click on Insert then Chart on the drop down menu, then Scatter, then Next and finally Series to get the following.
Click on **Time, min** in the **series** box to highlight it and click **Remove**.
With the lower Ln(Absorbance) highlighted the Y Values should read D2 to D7 and if the top Ln(Absorbance) is highlighted the Y Values should read B2 to B7. Now click Next. Type in the Chart title, X and Y Axis values, add Gridlines, and then click Next.
Now click on **Chart** in the top menu bar and click on **Add Trend line**. Highlight the top Ln(Absorbance) and click **Options** and select **Display equation** and **Display R=** then click **OK**.

Select **Chart** and **Add Trend line** again. Highlight the bottom Ln(Absorbance) and repeat the above process and click **OK**.
You can left click in the chart area to increase the size of the chart and move the statistics to convenient places.
N2O5 Kinetics

Absorbance

Time (min)

\[ y = -0.0303x - 4.3799 \]

\[ R^2 = 0.9971 \]

\[ y = 0.045x - 4.4621 \]

\[ R^2 = 0.9971 \]