To CH 131 lab students
From Bruno I. Rubio, Ph.D.
Subject Experiment # 6 calorimetry Excel spreadsheet
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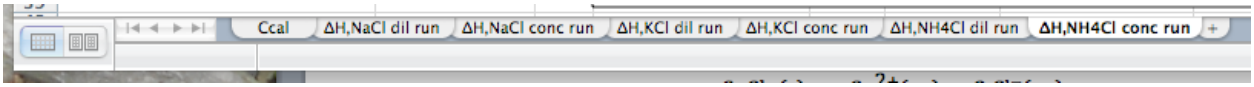
I created an Excel spreadsheet at

http://people.bu.edu/birubio/ch131/calorCalculator.xls

to help you present and analyze your data from Experiment # 6 (Calorimetry).

Open Excel
The file **calorCalculator.xls** has six tabs at the bottom of its window: the tabs correspond to runs in which the calorimeter constant was measured, and two each for the three different salts used:



Ccal worksheet
Input solution data
In cell **B2** enter the volume of cold water in the cup (~50 mL) and in cell **B4** enter the temperature at which it stabilizes before the run. In cell **B3** enter the volume of hot water in the cup (~100 mL), that is, enter the value of $V_{tot} - V_{cw}$, where V_{tot} is the total volume of water in the cup after the run. Assume that the temperature of the hot water is 100 °C.

Input temperature data
In cells **B9:B18** enter the temperature observed at each 30-sec interval: your data points update on the plot.

Draw a line through the temperature data
The value of $\mathscr{C}_{cal}$ is given by

$$\mathscr{C}_{cal} = -\left(\frac{4.18\ \text{J}}{\text{mL}\cdot^{\circ}\ \text{C}}\right)\left[V_{hw}\left(\frac{T_{mix} - T_{hw,i}}{T_{mix} - T_{cw,i}}\right) + V_{cw}\right]$$

where T_{mix} is the temperature that the solution would exhibit after the hot and cold water are mixed assuming instantaneous mixing and instantaneous heat transfer – neither condition is realized in this experiment – and is given by that point at which the *time* = 0 axis intersects a line drawn through the data. The spreadsheet plots linear least-squares

(best fit) lines through the data, but deciding where the lines begin and end is a judgment call on your part.

In cell **E2** enter the time in seconds at which you want the line to begin and in cell **E3** enter the time in seconds at which you want the line to end. The line updates on the plot.

Your results update in cells **H2:H5**.

Enthalpy of solution Δ*H* worksheets

Input solution data

In cell **B2** enter the mass of salt used. In cell **B3** enter the volume of water in the cup (~100 mL) and in cell **B4** enter the temperature at which it stabilizes before the run. The value of $\mathscr{C}_{cal}$ from the **Ccal** worksheet is displayed.

Input temperature data

In cells **B13:B22** enter the temperature observed at each 30-sec interval: your data points update on the plot.

Draw a line through the temperature data

The value of $\Delta\mathscr{H}$ is given by

$$\Delta\mathscr{H} = -\left[\frac{MW_{salt}\left(T_{mix} - T_{soln,i}\right)}{mass_{salt}}\right]\left[\left(\frac{4.18\ \text{J}}{\text{mL}\cdot^{\circ}\ \text{C}}\right)V_{soln} + \mathscr{C}_{cal}\right]$$

where T_{mix} is the temperature that the solution would exhibit after dissolving the salt in the water assuming instantaneous dissolution, instantaneous mixing, and instantaneous heat transfer – none of these conditions is realized in this experiment – and is given by that point at which the *time* = 0 axis intersects a line drawn through the data. The spreadsheet plots linear least-squares (best fit) lines through the data, but deciding where the lines begin and end is a judgment call on your part.

In cell **E2** enter the time in seconds at which you want the line to begin and in cell **E3** enter the time in seconds at which you want the line to end. The line updates on the plot.

Your results update in cells **H2:H4**.

I M P O R T A N T !

(1) Write the value of T_{mix} on each plot – don't make me figure it out and don't make me look for it.

(2) The lab report is not just a printout of the Excel spreadsheet. As always, follow the format of the lab report form at

http://people.bu.edu/birubio/ch131/exp06.pdf