Triple Point

1. The P and T vs. t data are simply reconstructions of your experiments. Choose the double-Y axis option in KG to display both T and P vs. time on the same figure. Make a separate figure for each of your runs (should be four).

2. For the quantitative analysis of the controlled runs, first correct your thermistor T values to true, following the procedures spelled out in the document on T calibration. Then plot ln P vs. $1/T$, in accord with eq 6. The slope of such a plot should be – H_m/R, for both the sublimation curve and the vaporization curve. Before you fit your data to this equation, you may need to mask out some of your data. For example, if the stopcock to the pump was opened during the run to remove any air that had leaked into the cell, a few points will be non-equilibrium data.

    If you choose to fit your data to eq 7, you will need to include either T_0 or P_0 as an adjustable parameter in your fit (meaning there will be two adjustable parameters, just as in fitting to eq 6). For example, if you set T_0 equal to the TP temperature in your fit, then P_0 will be the fitted estimate of the TP pressure. For data near the boiling point, setting $P_0 = 1.00$ atm will yield a fitted estimate of the boiling point, T_0.

    Hess's Law states that H is the same for two different reaction pathways that connect the starting substance with the final substance (at a given temperature). Here there are two paths from solid to gas:

    $$X(s) \quad X(g)$$

    and

    $$X(s) \quad X(l) \quad X(g)$$

    Thus H for the first is equal to the sum of the H values for the second.

    The second paragraph under item 2 of "Data Analysis" (p. 58 of Class Pak) suggests that you consider the effects of transforming your data from P to ln P. You may just use an unweighted fit here if you like; but be sure you <u>do</u> know how to calculate the weights for y ln P for a properly weighted fit when the uncertainty in P is constant.