

DSC Melt Crystallize

The Excel file associated with our DSC demo (or perhaps some previous year) is linked nearby this assignment. The plot shows a *heating* run on a quenched sample. The "orientation" of this particular differential scanning calorimeter is to plot endotherms as *down-going* transitions.

What, exactly, is being plotted with the blue data? That is, what does the y-axis represent for the blue data?

heat flow vs. temp.

1. Explain the relationship between the pink data and blue data.

Pink is derivative of the blue.

2. Starting with the blue data, obtain YOUR OWN pink data set, either using a program of your own design (e.g., QuickBasic, Visual Basic, C++, Java, whatever) or using Origin or similar.

If x is in column A and y is in column B, then column C can be: $C2 = (B2 - B1) / (A2 - A1)$

3. Describe the transition occurring at about 0°C.

glass-like

That will sorta be a derivative. Origin can do it with smoothing.

4. Describe the transition occurring at about 36°C.

melt crystallization exotherm

5. Describe the transition occurring at about 172°C.

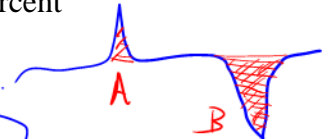
melt endotherm

6. Suppose this polymer is 100% crystallizable. Estimate the actual percent crystallinity of the sample prior to the beginning of the heating run.

*Area A from mass of paper cut out or Origin.
Area B similar*

7. What does the mixture of crystalline and amorphous zones ensure?

Toughness



Then % that melt crystallized is $100 \times \frac{A}{B}$

Percent that was already crystallized is: $100 \left(1 - \frac{A}{B}\right)$