



### II. Post mortem: lab this week

- A. You were expected to plot the temperature of water versus time. You should explain why you got the graph you did.
- B. Melting point determination: This is a measure of the purity of your product. It is also useful for substance identification. If you take the melting point of a fairly pure product, it should be within a few degrees of the published melting points.
  1. For this week, typical results were: Urea: 131.4 – 133.9 °C, cinnamic acid: 132.9 – 135.2 C°, and urea-cinnamic acid mixture: 99 – 114 degrees C°. Be sure to explain this phenomenon.
  2. A lower melting temperature is an indication of impurity. This is because the melting point is associated with freezing point depression. These are two different terms for the same equilibrium point. The depression occurs because solidifying involves crystal formation. If you have crystals of these organic compounds, the uniform orientation pattern of the molecules is interrupted by impurities. This makes it more difficult for the compound to remain as a solid crystal.
  3. Impurities also result in a wider melting point range. This is because the impurities are not evenly distributed among the crystals.
  4. If your melting point is *higher* than the published value, this means that your product is definitely not the one you were trying to synthesize.
  5. If your melting point is *lower* with a sharp range, this is not the compound you were looking for. If the range is broad, then you probably have a contaminated sample of your compound.
  6. If your melting point matches, you can only say that you have a *possible* match between the theoretical and experimental product.
  7. Mixture melting point and eutectic point: Usually the melting point of a mixture has a broad range. As you contaminate product A with B, your melting point of A goes down. The same is true of contaminating B with A. There is a particular point at which the melting point of the two compounds is lower than it is supposed to be for either pure compound, but is a *sharp* range. The sharp range is typical of uncontaminated compounds. This point is called the eutectic point. How can you tell if you are at the eutectic point? Add some more A to the mixture and see if the melting point range broadens.

### III. Next Week: Separation/Purification Technique

- A. Distillation is the technique we are using to separate water from methanol. This technique has been used widely.
- B. Distillation is used to separate two or more miscible liquids.
- C. Distillation is taking a liquid, heating it to a vapor, and then cooling it back to a liquid.