

Name:

Date:

Class:

## Liquid Crystal Lab Student Sheet

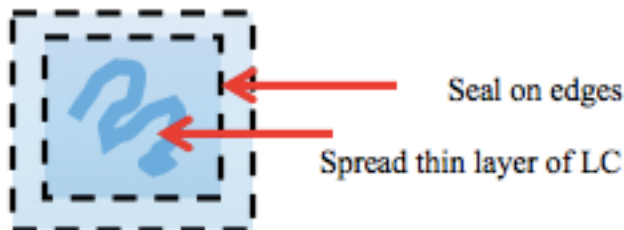
### Part 1 Liquid Crystal Synthesis

- 1) Gather materials for measuring; weight paper, scale, cholesteryl oleyl carbonate, cholesteryl pelargonate, cholesteryl benzonate, small glass vial, and small spatula.
- 2) Fold the weight paper into a triangle one direction then unfold it. Next, fold it into a triangle the other direction creating an 'X' on the weight paper that will act as a make-shift bowl for measuring the materials.
- 3) Place the weight paper on the scale and zero out the mass.
- 4) Measure the following amounts and empty into 1 small glass vial:
  - cholesteryl oleyl carbonate- 0.65g
  - cholesteryl pelargonate- 0.25g
  - cholesteryl benzonate- 0.10g
- 5) Place materials on a hot plate until completely melted. (If you are using a hot plate that you can control, set the temperature to 150°C for about 2 minutes.) If you do not have access to a hot plate, using a hair dryer on a hot setting for about 8 minutes will melt the materials.
- 6) Once the solid sample is melted, you can transfer it in to smaller vials or you can transfer directly on to the contact paper. It should have the consistency of honey.



### Part 2 Liquid Crystal Thermometer

- 1) Cut 2 squares (5 cm X 5 cm) of contact paper.
- 2) Using the small spatula, transfer a thin layer of liquid crystal into the center of one contact paper square.
- 3) Place the second square on top and seal the edges of the two contact paper squares together to prevent the liquid crystal from seeping out the sides.



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**Experiment 1:** test if the color change is easier to detect on a white or black background

Hypothesis:

Results:

**Experiment 2:** use a water bath with a thermometer and determine the range of temperatures at which the liquid crystal can detect. Meaning what temperature is the highest that a color change can be observed and what temperature is the lowest that a color change can be observed.

Hypothesis:

Observations/ Data Collection:

Results:

**Challenge:** As a group decide on one of the three compounds to modify the amount used. Then test through the same experiments as 1 and 2 and see what changes have occurred. Be sure to record your data.

**Post-Lab Questions:** (*answer on a separate piece of paper*)

1. What consistency do the liquid crystals remind you of?
2. LCD's are in computers, TVs etc. What do you think would happen if you applied a lot of heat to one of these LCD screens?
3. What color is observed at the hottest point? At the coolest point?
4. What is the sequence of colors observed?
5. Are the colors more vivid on a white or black background?
6. Write out the procedure steps for the experiment where one compound amount was modified. What changes did you observe? Why do you think this occurred? What further investigations could you do to test this hypothesis?