

Alternate CBL Instructions

Evaporative Cooling

Safety Precautions



- The chemicals used in this experiment are flammable and poisonous. Do not inhale the fumes from these chemicals. Do not have any open flame near these chemicals. Use in a well-ventilated room or fume hood.
- Avoid contact with the chemicals on your skin or clothing. Notify your teacher immediately if an accident or spill occurs.
- Wash your hands after the lab is over.
- Use caution when plugging in, using, or unplugging the CBL 2 unit's power supply.

Materials

CBL 2 unit

link cable

TI graphing calculator

DataMate program

temperature probe

methanol (methyl alcohol)

ethanol (ethyl alcohol)

2-propanol (isopropyl alcohol)

masking tape (two pieces)

filter paper (three pieces, 2.5-cm \times 2.5-cm)

small rubber bands

100-mL beaker

Procedure

1. Plug the temperature probe into Channel 1 of the CBL 2 unit. Connect the TI graphing calculator to the CBL 2 unit with a link cable. Press the ends of the cable securely into each unit.
2. Turn on the graphing calculator. Start the DataMate program. Press CLEAR to reset the application program. The temperature probe should automatically be detected and begin displaying temperature. For this experiment, read the temperature from the calculator screen.
3. Wrap the temperature probe with a square piece of filter paper fastened by a small rubber band. To do this, first slip the rubber band onto the temperature probe. Then wrap the paper around the temperature probe and roll the rubber band over the wrapped paper. The paper should fit snugly over the temperature probe. Set up a data table similar to the one in the text.
4. Obtain a small beaker of methanol. Place the paper-covered end of the temperature probe in the container of methanol. Do not let the container fall over. Keep the temperature probe in the container for 1 min.

5. After 1 min has elapsed, record the temperature reading from the graphing calculator in the data table under T_1 . This is the initial temperature of the methanol.
6. Remove the temperature probe from the methanol. Place the temperature probe over the edge of a table top so that the temperature probe's tip extends about 5 cm beyond the edge of the table. Use the masking tape to anchor the temperature probe in place.
7. Observe the temperature during the experiment. After 4 min have elapsed, observe and record the temperature in the data table in the column marked T_2 .
8. Roll the rubber band up the temperature probe and dispose of the filter paper as directed by your teacher.
9. Repeat steps 3–8, but use ethanol as the liquid. Record your results in the data table.
10. Repeat steps 3–8, but use isopropyl alcohol as the liquid. Record your results in your data table.

Alternate lab procedure, using a CBL unit

1. Connect the temperature probe to the Channel 1 of the CBL unit. Connect the TI graphing calculator to the CBL unit with a link cable. Press the ends of the cable securely into each unit.
2. Turn on the calculator and the CBL unit. Start the PHYSICS program and go to the MAIN MENU.
3. From the MAIN MENU, select the SET UP PROBES menu. Select ONE as the number of probes. From the SELECT PROBE MENU, select TEMPERATURE. Press ENTER to return to the MAIN MENU.
4. From the MAIN MENU select COLLECT DATA. Then select MONITOR INPUT from the DATA COLLECTION menu. The temperature will be displayed on the calculator.
5. Wrap the temperature probe with a square piece of filter paper fastened by a small rubber band. To do this, first slip the rubber band onto the temperature probe. Then wrap the paper around the temperature probe and roll the rubber band over the wrapped paper. The paper should fit snugly over the temperature probe. Set up a data table similar to the one in the text.
6. Obtain a small beaker of methanol. Place the paper-covered end of the temperature probe in the container of methanol. Do not let the container fall over. Keep the temperature probe in the container for 1 min.
7. After 1 min has elapsed, record the temperature reading from the graphing calculator in the data table under T_1 . This is the initial temperature of the methanol.

8. Remove the temperature probe from the methanol. Place the temperature probe over the edge of a table top so that the temperature probe's tip extends about 5 cm beyond the edge of the table. Use the masking tape to anchor the temperature probe in place.
9. Observe the temperature during the experiment. After 4 min have elapsed, observe and record the temperature in the data table in the column marked T_2 .
10. Roll the rubber band up the temperature probe and dispose of the filter paper as directed by your teacher.
11. Repeat steps 5–10, but use ethanol as the liquid. Record your results in the data table.
12. Repeat steps 5–10, but use isopropyl alcohol as the liquid. Record your results in your data table.
13. Press “+” to end data display/collection. Select RETURN TO MAIN, and then select QUIT from the MAIN MENU to exit the PHYSICS program.