**THE EFFECT OF TEMPERATURE ON AN EQUILIBRIUM SYSTEM**

**LAB EQL.1**

*The Caliper*, *Vernier* Software & Technology.

**PURPOSE**

The purpose of this lab is to study the effect of temperature on a well-known Cobalt Chloride equilibrium system and to detect and explain any change in conductance.

**MATERIALS**

LabQuest or Chromebook with Graphical Analysis App or Computer with Logger Pro

Cobalt Chloride Hexahydrate (s) 1g Ethanol (95%)- 170 ml

Erlenmeyer flask 250 ml Vernier Temp probe

Vernier conductivity probe 600 mL beaker (x2)

Distilled water Hot plate

Ice

Rubber band

Balance

**PROCEDURE**

1. Attach the temperature probe to channel one and the conductivity probe to channel two of the

 LabQuest.

2. If using an older sensor, set the conductivity probe to 0-600μS/cm range if applicable.

3. If using a computer, attach the LabQuest to the computer and start up the Logger Pro program. If using the new Go Direct Sensors, you may connect directly to a Chromebook via USB or Bluetooth, using the Graphical Analysis App. The LabQuest may also be used as a stand-alone device for collecting data.

4. Set up a data-collection rate of 6 readings/minute for 10-15 minutes.

5. Dissolve 1g of solid Cobalt Chloride in 170ml of Ethanol in a 250ml Erlenmeyer flask.

6. Slowly add distilled water until the color changes.

7. Place both probes in the flask with the solution.

8. Start collection and collect data for 1 minute at room temperature.

9. Place the flask in the hot water bath (70 ºC).

10. Collect data for 5 minutes.

11. Transfer the flask to the cold-water bath. (with ice, ~5 ºC).

12. Collect data for 5 minutes (total of 12 to 15 minutes).

**DATA ANALYSIS**

1. Write the complete and balanced equation for this reaction.

2. Write the net ionic equation for this reaction.

3. What color changes, if any, did you observe? Can you explain what caused these changes?

4. Is this reaction endothermic or exothermic?

5. What change did you observe in conductivity and why?

6. If a printer is available, print and attach the graphs you developed.

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