Name_____**Period**_____

Ch 18 Chemical Equilibrium Lab- Temperature Effects

$$Co(H_2O)_6^{2+}(aq) + 4Cl^-(aq) \leftrightarrow CoCl_4^{2-}(aq) + 6H_2O(l)$$

Pink **Blue**

Materials:

3- 250 mL beakers, 1 small test tube, 1 test tube clamp, graduated cylinder, burner (or hot plate), ice, hot hands (or gloves), 0.5 M cobalt (II) chloride hexa-hydrate solution made in 3M HCl **(be careful not to spill or touch, alert teacher immediately if this occurs)**

Procedure:

Pour approximately 200mL of water into a 250 mL beaker. Put your test tube in a test tube clamp and go to teacher's desk. You will be handling the test tube with the test clamp from now on! From your teacher, **carefully** pour approximately 10mL of 0.5M cobalt solution into your test tube. At your lab table, **carefully** place the test tube in the room temperature water inside the 250mL beaker. Record the temperature of the water._____°C

In the space below, record a few observations about what you see.

Observations:

Now, place some heated water into an empty beaker. Put the test tube into the hot water. You should see some change in the system. Record the temperature of the heated water_____°C. Also record a few observations about the change in the space provided below.

Observations:

Next make an ice bath filling your last empty beaker 2/3 full with ice and then add water up to the level of ice in your beaker. Record the temperature of this ice/water mixture_____°C. Put your test tube in the cold water. Write a few observations about what you see.

Observations:

You may want to now move the test tube **carefully** between the 3 different temperature beakers to see the color changes again. Clean up your work area. **DO NOT DISCARD THE COBALT SOLUTION IN TEST TUBE. SAVE FOR NEXT CLASS.**

Analysis Questions:

1. When you increased the temperature of the equilibrium, what direction was the equilibrium shifted? (forward or reverse?)_____
2. When you decreased the temperature of the equilibrium, what direction was the equilibrium shifted?_____
3. Using heat as a reactant or product in this reaction, write out the balanced equation from the front page, including heat.

4. Make a few generalizations about endothermic and exothermic reactions. Comment on how temperature affects different reactions in the format that follows.

Raising the temperature of an equilibrium reaction pushes the equilibrium towards the _____ side.

Lowering the temperature of an equilibrium reaction pushes the equilibrium towards the _____ side.