SERIAL DILUTION LAB

Objective:

1. Become familiar with serial dilution calculations.
2. Become familiar with serial dilution techniques.

During this activity you are going to perform a serial dilution using a solution of cobalt(II)chloride. The cobalt(II) chloride solution was created by adding 1.0 mole of cobalt(II) chloride to 1.0L of water thus creating a one molar solution of Cobalt(II) chloride.

If the molar mass of cobalt(II) chloride is 131 g/mol

1. Calculate the percent cobalt(II) chloride in 1 L solution (m/v).
2. Calculate the ppm cobalt(II) chloride in 1 L solution.
3. What are the Eq/L of Co^{2+} and Cl^- in your initial solution?

These are the initial concentrations of your solution in M, %, ppm and Eq/L.

Methods

Obtain a multi-well tray, a dropper, a beaker of DI water and a container of the 1M Cobalt(II) chloride. Put ten drops of the Cobalt(II) chloride solution into well one and 5 drops of water into 5 other well plates.

Now take the dropper and carefully transfer five drops of the Cobalt(II) chloride solution from well one into well two. Use a separate stirring rod (not the tip of the dropper!) to stir up well two.

After you are done with well two carefully, wash the glass dropper. Now transfer five drops from well two into well three.

Continue the serial dilution all the way through to the last well making sure to carefully wash the dropper and stirring rod before making a transfer to the next well

Calculations of diluted concentrations.

Solutions	M	%	ppm
Initial			
1st dilution			
2nd dilution			
3rd dilution			
4th dilution			
5th dilution			

Answer the following questions on the back of your worksheet:

1. What is the dilution ratio in this experiment?
2. Do the calculation of the M, % and ppm concentration of the final solution using the formula $C_f = C_i \times (1/d)^n$
3. How many parts per billion were in your last well?
4. How many parts per trillion were in your last well?
5. What was the last well in which you could see any trace of the Cobalt(II) chloride?
6. Were there any Cobalt(II) chloride molecules in the last well?
7. Is there any way to prove your answer to question four?
8. From what you have learned in this activity, do think it is possible that clean, clear drinking water could be contaminated with chemical toxins?
9. How effective do you think the human senses of smell, taste, and sight are at monitoring water quality?
10. One way of dealing with water contaminants is through dilution. As the saying goes "dilution is the solution to pollution." Do you think that dilution is an effective way of dealing with water pollution?
11. How does this activity relate to the concept of the non-threshold dose-response model versus the threshold dose-response model? (Remember that the threshold dose-response model says that a toxic chemical must reach a certain level before it starts to do any harm to an organism whereas the non-threshold dose-response model says that harm begins with the first molecule of the substance in the organisms body)
12. What are two ways that the EPA uses to detect very small amounts of toxic contaminants in our air or water?

When you are finished, thoroughly wash the well plate, droppers, the stirring rod, and the well tray and put away the materials for this activity.