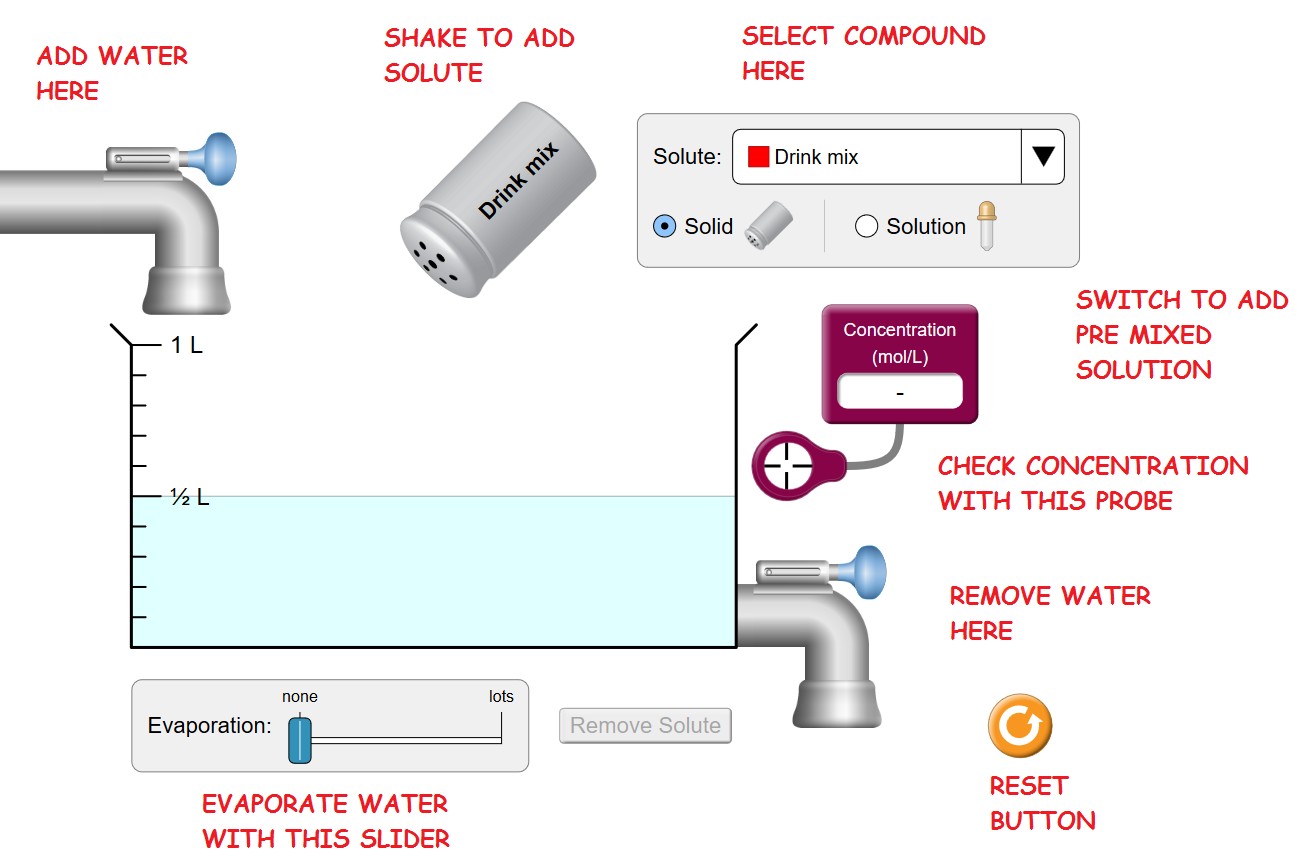
Concentration weblab

Name and date:

Go to the weblab here: <https://phet.colorado.edu/sims/html/concentration/latest/concentration_en.html>



Answer all questions below. KEEP THE SAME LAYOUT AND NUMBERING!!!... or I won’t be able to grade it.

Part 1 – Introduction

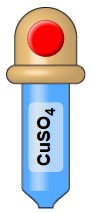
Move the Concentration Probe into the liquid. Shake some drink mix into the water. Continue to add more.

1. What happens to the concentration as more solute is added?
2. What are the units of concentration on the meter?
3. What happens to the color as more solute is added?
4. Now add water from the faucet. What happens to the concentration as the quantity of water increases?
5. Now remove water with the valve on the lower right. Does the concentration increase, decrease, or stay the same? Explain why.
6. Now remove water with the Evaporation Slider Bar on the bottom. Does the concentration increase, decrease, or stay the same? Explain why.

Part 2 - Saturation

Press RESET. Switch the SOLUTE to Copper II Sulfate (CuSO4).

1. Move the Concentration Probe into the liquid. Add a bunch of CuSO4 using the shaker. Can a saturated solution be created?
2. How do you know when a saturated solution is created?
3. What is the concentration in mol/L at saturation?
4. Add more CuSO4 solute. Does the concentration continue to go up, or does it stay the same? Explain why.



Part 3 – The Eyedropper

Press RESET. Switch to the eyedropper. Stay with copper II sulfate as the solute.

1. Completely drain the water from the beaker. Squirt about ¼ L of CuSO4 solution into the beaker. Using the concentration meter, what is the concentration of the solution in the eyedropper in mols/L?

Part 4 – Controlling the concentration

Press RESET. Select CuSO4 as the solute again.

1. What is the molecular weight of CuSO4 in g/mol? Hint: It’s between 150 and 170 g/mol. Answer \_\_\_\_\_\_\_\_\_\_\_\_ g/mol
2. Drain the water level down to 0.25 L. Then add enough CuSO4 from the eyedropper to create a .5 Molar solution. What is the total volume in L? (Hint: it will be quite a bit more than 0.25 L)
3. How many moles of CuSO4  are now in the beaker? (Check: the answer is .25 mol, but you must show your work!)
4. Predict the concentration in mols/L if you now were to top-off the beaker to 1 L with water from the faucet. Show your calculation, include units.
5. Now actually add water up to the 1 L mark.
   1. What is the concentration? (Check: it should be about .25 mol/L)
   2. Was your calculation correct?
   3. Fix your calculation if it wasn’t correct!
6. Predict the concentration in mols/L if you were now to evaporate the solution from 1 L down to .75 L. Show your calculation.
7. Now actually evaporate water until there is .75 liter of solution left in the beaker.
   1. What is the concentration in mol/L? (Check: it should be about .33-.34 M)
   2. How close was your prediction?
   3. Fix your calculation if it wasn’t correct!
8. From the concentration & volume, calculate the number of moles of solute in the solution at this point. Show your calculation, using (mol/L) x (L). (Check: it’s .25 mol, but show your work!)
9. Predict the concentration and the moles of CuSO4 solute if you were to add water up to the 1-L mark again. (Check: it’s .25 mol/L and .25 mol, but show your work!)

Now drain the beaker down to the ½-L mark. Be careful not to overshoot, or you will need to start over!

1. Did the concentration go up, down, or stay the same? Explain why.
2. Now calculatethe number of moles of CuSO4 solute still in the solution, using (mol/L) x (L). Show your calculation. (Check: it’s .125 mol, but show your work!)
3. Predictthe concentration if you were now to dilute the volume back up to 1 L with water. Show your calculation.
4. Now actually add water from the faucet up to the 1-L mark.
   1. What is the concentration in mol/L? (Check: it’s .125 M, but show your work)
   2. How close was your prediction?
   3. Fix it if it wasn’t correct!

Part 5 - Summary

1. Adding solute to an unsaturated solution causes the concentration of the solution to: INCREASE /DECREASE/ REMAIN UNCHANGED.
2. Adding solute to a saturated solution causes the concentration of the solution to: INCREASE /DECREASE/ REMAIN UNCHANGED.
3. Adding pure water to a saturated solution will cause the concentration of the solution to: INCREASE /DECREASE/ REMAIN UNCHANGED.
4. Evaporating water from an unsaturated solution causes the concentration of the solution to: INCREASE /DECREASE/ REMAIN UNCHANGED
5. Evaporation acting on a saturated solution causes the concentration of the solution to: INCREASE /DECREASE/ REMAIN UNCHANGED.