

Serial Dilution Lab

In this unit we will be discussing measurements of concentration that use both very big and very small numbers. This exercise is intended to familiarize us with using scientific notation (to express big and small numbers easily) and the process of using serial dilutions to make concentrations of known values.

Materials:

FD&C Red Dye #40 (100% concentration)
Dilution Well plate
Dropper pipette
Distilled water
Crucible
Ring stand and burner

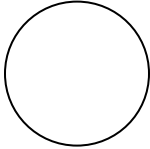
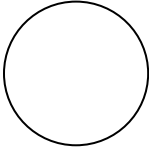
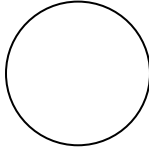
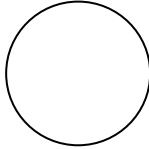
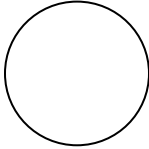
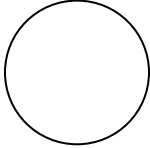
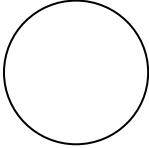
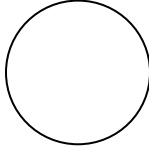
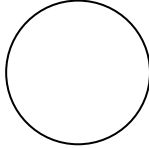
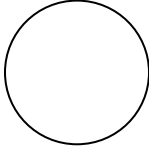
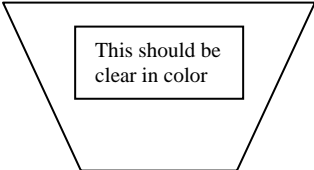
Procedure:

1. Put 10 drops of FD&C Red Dye #40 in one well of the plate. This 100% solution can also be called 1X.
2. Take one drop from the well you just filled and put it into the well next to the first well. Using a clean dropper pipette, add 9 drops of distilled water to the single drop of 1X solution.
3. The second well should now have 10 drops of liquid (1 of Red Dye and 9 distilled water). This is your 0.1X solution.
4. Repeat this dilution process until you can barely see the red dye in the wells. Record the concentrations (as 1X, 0.1X, etc.) of each dilution as you make them on the next page in the appropriate location. You may also want to describe the color/darkness of the dilutions.
5. Make one more dilution (in the crucible) so that you can no longer see and FD&C Red Dye #40. Since we can no longer see the Dye, does that mean there is no Dye in the dilution? Use the next steps to find out.
6. To see if there is any Red Dye in the last dilution, use the burner and ring stand to evaporate the water and leave behind any dissolved substances.
7. How many molecules of FD&C Red Dye #40 were actually in the last solution? To calculate this we need to make some assumptions:
 - a. 10 drops of the 100% solution has a mass of 1 gram.
 - b. 1 gram of FD&C Red Dye #40 has approximately 1.2×10^{22} molecules in it. (this is based on its molecular weight and a little finagling with Avogadro's number)
 - c. Now, depending on how many dilutions you made, you can figure out how many molecules of Red Dye #40 are actually sitting on the

bottom of your crucible. HINT: your first dilution has 1/10 the number of molecules as the original Dye.

SHOW YOUR CALCULATIONS HERE:

Serial Dilution Data Page

				
Concentration= 1X	Concentration=	Concentration=	Concentration=	Concentration=
				
Concentration=	Concentration=	Concentration=	Concentration=	Concentration=
				
		This should be clear in color	Crucible dilution concentration=	

ADDITIONAL QUESTIONS

The above example was simple 1/10 dilution. In our LD50 Lab, you will also need to make dilutions that are not simply 1/10 of the previous concentration.

Assume you are starting with a 100 mL of 10X solution. Explain how you would make a 5X dilution?

Explain how you could make a 2.5X dilution. There is more than one way to do this, but try to do so using the least amount of liquid.

How would you make a 7.5X dilution?