Honors Chemistry Hour\_\_\_\_\_ Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
Dr. Wexler  
Lab: Practicing Serial Dilution with Colored Dyes  
Date assigned:

**Introduction:** In scientific experiments it can be useful to examine the effect on a chemical reaction of changing the concentration of one of the chemicals being combined. This is done by serial dilution.

In a serial dilution, the chemical is *reduced in concentration* by the same factor in series.

That is, if the solution to be diluted starts at full concentration (“neat”), a two-fold serial dilution would look like this:

1 then 1/2 then 1/4 then 1/8 then 1/16, etc. of the original concentration, where “1” is the original concentration.

The easiest way to do this is to set up a multi-well plate (or a bunch of test tubes).

**Purpose:** In this exercise you will perform a two-fold serial dilution of a blue solution, then “react it” with a red solution. The concentrations of the red and blue solutions are equal when the mixture is neither red nor blue. Thus, if you know the concentration of one solution you can estimate the concentration of the other.

**Procedure:**

1. Pipette 1mL of water into each well of a single row of the multi-well plate.

2. Pipette 1mL of blue solution (“reactant 1”) into the first well (2ml total). Mix by stirring with the pipette tip (or sucking up and down slowly).

3. Pipette 1mL from well 1 and eject into well 2. Mix.

4. Pipette 1mL from well 2 and eject into well 3. Mix.

5. Pipette 1mL from well 3 and eject into well 4. Mix.

6. Pipette 1mL from well 4 and eject into well 5. Mix.

7. Pipette 1mL from well 5 and eject into well 6. Mix.

8. Pipette 1mL from well 6 into the discard cup.

All wells will now contain 1ml of serially diluted blue solution according to the following table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Well 1 | Well 2 | Well 3 | Well 4 | Well 5 | Well 6 |
| Dilution | 1/2 | 1/4 | 1/8 | 1/16 | 1/32 | 1/64 |

9. Rinse the pipette tip with water and pipette 1mL of red solution (“reactant 2”) into each of the six wells containing the serially diluted blue solution.

**Results:**

1. Which well was neither blue nor red? What was the dilution for that well?

2. Assume that the concentration of dye in the red solution was 1mg/mL. Therefore, the concentration of blue solution at the dilution which was neither blue nor red (see question 1 above) is the same as that of the red dye.

To calculate the original concentration of the blue solution, divide 1mg/mL by its dilution at “neutralization”.

For example, if neutralization occurred in well 6, then the concentration of blue dye would be 1mg/ml ÷ 1/64 = 1mg/mL x 64 = 64mg/mL

Show your calculation below: