Name: _____ **Date** _____ **Section** _____

Lab Partner: __ONLINE DATA_____

DATA SHEET #1 for single dye visual colorimetry data

Red (or Blue) Unknown # _____65_____

Red (or Blue) Dye Standard Concentration (ppm) __9.80 ppm_

Strip	Well#	1	2	3	4	5	6	7	8	9
		# of Drops in Well								
"I"	Red (or Blue) Standard	8	7	6	5	4	3	2	1	0
"II"	Red (or Blue)Standard	8	7	6	5	4	3	2	1	0
	Water	0	1	2	3	4	5	6	7	8

Strip "II" Calculated dye concentration data

Well # Diluted Dye Conc, (ppm) = (ppm Std.) (#Drops of Std.) / (Total Drops in Well)

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

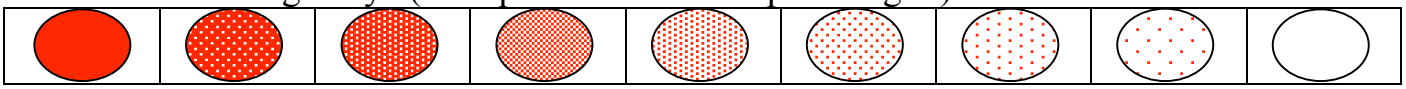
7 _____

8 _____

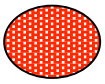
"III" Red (or Blue) Unknown Best Color Match with Well #_____ of Strip "II"

Concentration of Dye in Unknown _____

Simulation of Single Dye (8 drops far left to 0 drops far right.)



Determine which cell above that the unknown below matches.



Name: _____ **Date** _____ **Section** _____

Lab Partner: ____ONLINE DATA_____

DATA SHEET #2 for purple dye mixture visual colorimetry data

Purple Unknown #____55_____

Strip	Well#	1	2	3	4	5	6	7	8	9
		# of Drops in Well								
"IV"	Red Standard	8	7	6	5	4	3	2	1	0
	Blue Standard	0	1	2	3	4	5	6	7	8

Strip "IV" Calculated red dye fraction data

Well # Fraction of Red Dye in Well (= Drops of Red Dye / Total Drops in Well)

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

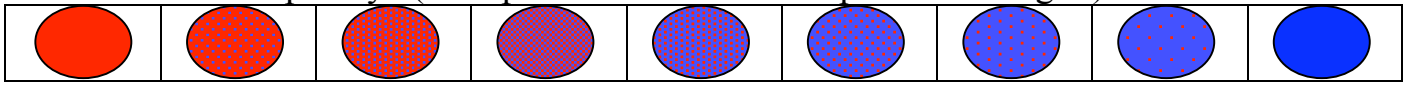
8 _____

9 _____

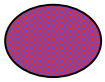
Purple Unknown Having the Best Color Match with Well #_____ of Strip "IV"

Fraction of Red Dye in Purple Unknown _____

Simulation of Purple Dye (8 drops Red far left to 8 drops Blue far right.)



Determine which cell above that the unknown below matches.



Name: _____ **Date** _____ **Section** _____

Lab Partner: ___ONLINE DATA_____

DATA SHEET #3 for Instrumental Spectrophotometry Data

NOTE: You need to record transmittance values, but you will be plotting absorbance values.

Transmittance:

Cuvette	Transmittance at Wavelength (nm)								
	400	**450**	**500**	**520**	**550**	**600**	**620**	**650**	**700**
Red Std.	93.8	88.0	47.2	27.6	40.0	99.0	99.6	100	97.6
Blue Std.	80.4	95.2	93.6	91.0	81.2	35.6	13.0	27.8	85.6
Red #65 Unknown	98.8	96.4	75.0	36.2	68.8	87.6	96.8	100	98.4
Purple #55 Unk	86.2	94.2	74.0	45.8	62.4	51.6	24.2	31.4	88.2

Absorbance: Absorbance = log(100/Transmittance)

Cuvette	Absorbance at Wavelength (nm)								
	400	**450**	**500**	**520**	**550**	**600**	**620**	**650**	**700**
Red Std.	____	____	____	____	_____	____	____	____	_____
Blue Std.	____	____	____	____	_____	____	____	____	_____
Red (or Blue) Unknown	____	____	____	____	_____	____	____	____	_____
Purple Unknown	____	____	____	____	_____	____	____	____	_____

From Graph:

Red Dye Max. Absorbance = _____ at _____nm (λ Max) Red Std. Conc.=_____ppm

Blue Dye Max. Absorbance=_____ at _____nm (λ Max) Blue Std. Conc.=_____ppm

	Absorbance of Unknown (at λ Max.)	**Absorbance of Standard** (at λ Max.)	**Abs Ratio Unk/Std** (at λ Max.)	**Dye Cone. in Unknown**
(Red / Blue) Unknown	_____	_____	_____	_____
Red in Purple	_____	_____	_____	_____
Blue in Purple	_____	_____	_____	_____

Name: _____

Section: _____ **Date:** _____

Colorimetry & Spectrophotometry – Post Lab Questions

1. If fingerprints are left on the cuvette, how does this affect the % transmittance? the absorbance?

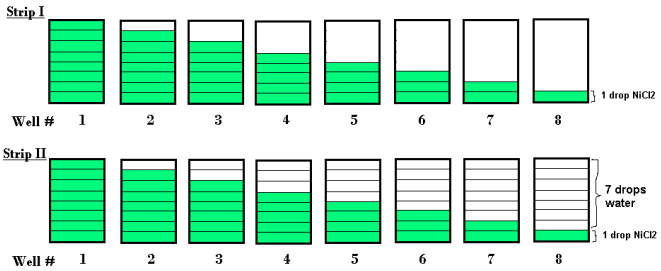
2. The standard solutions of red & blue dye for this experiment were prepared with distilled water. There was another bottle of red dye solution that had been prepared with ethanol. If the latter solution were used, what would you need to use for a blank?

3. For your **Red (or Blue) Unknown**, compare your colorimetry concentration results to your spectrophotometry concentration results. To do this, calculate a Percent Error using the colorimetry results as your experimental results and your spectrophotometry as your theoretical results. Please show calculation.

4. For your **Purple Unknown**, compare your colorimetry concentration results to your spectrophotometry concentration results for the "Red in Purple". To do this, multiply your colorimetry results times the concentration of the red dye. Then, calculate a Percent Error using the colorimetry results as your experimental results and your spectrophotometry as your theoretical results.

5. Which method do you think was more effective at determining the concentration? Explain why you feel this way. (***Note:*** *As this is your opinion, either answer will be considered correct as long as it is supported with a reasonable explanation*.)

6. Using the well strips below, the student put the following number of drops in the wells. In strip I, 1-8 drops of red dye standard solution (6.30 ppm) were added as shown in the diagram.
In strip II, additional drops of water were added in order to have the same total volume of 8 drops for each well.



Given: The student found that the unknown solution of red dye matched well #5 on Strip II.

a. What is changing in the first well strip – concentration or pathlength?

b. What is changing in the second well strip – concentration or pathlength?

c. Looking from the top how does the intensity compare for Strip 1 to Strip 2?
more intense – the same – less intense

d. Using $C_1V_1 = C_2V_2$, what is the approximate concentration in ppm for the unknown?

7. Using Excel or a similar program, make **4 Plots of Absorbance Data** (scatter plots) using your data (x = wavelength, y = Absorbance) and attach to the post lab.

For, **Graph 1**y = Absorbance Red Standard
Graph 2y = Absorbance Blue Standard
Graph 3y = Red (or Blue) Unknown – will appear similar to #1 or #2 depending on whether you have a blue or red unknown, respectively.
Graph 4y = Purple Unknown

#2 & #3 if Blue Unknown

#1 & #3 if Red Unknown

Abs. vs nm curves
Overlay plot of Blue and Red dye

Red/Blue Dye mix
plot of Abs. vs nm for Purple

#4

plot of Abs. vs nm for Blue Dye

plot of Abs. vs nm for Red Dye