EXP. NUMBER	EXPERIMENT/SUBJECT	DATE
	Guided Inquiry w/ Beer's Law	

NAME	LAB PARTNER	LOCKER/DESK NO.	COURSE & SECTION NO.
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Beginning Question

Hypothesis: if the concentration of the stock soln is greater then the absorbancy will be greater; but the lower the transmittance will be.

Safety:

Tests: clean cuvettes (before + after) w/ distilled H_2O, multiple measurements, Beer's law + how relates to $y = mx + b$

*work on other paper

Solution	A	B	C	D	E	F	G	H
Avg. A	.859	.689	.537	.370	.260	.188	.0918	0
Concentration	6.61×10^{-6}	5.30×10^{-6}	4.13×10^{-6}	2.85×10^{-6}	2.00×10^{-6}	1.45×10^{-6}	7.06×10^{-7}	0

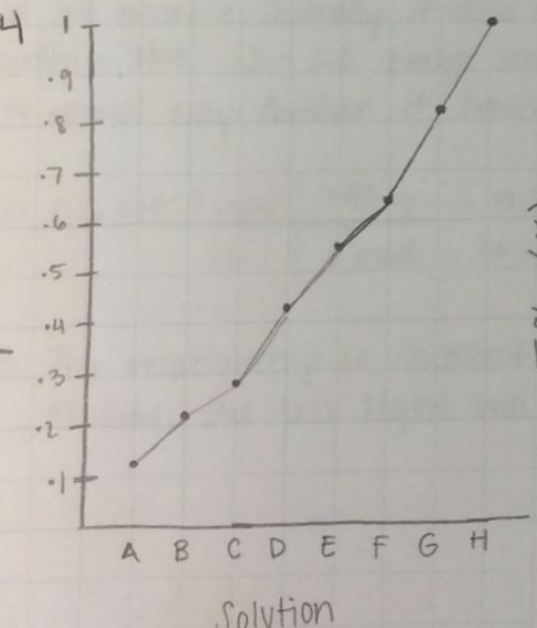
	T	%T	1/T	-log T
A	.138	13.8	7.23	.859
B	.205	20.5	4.89	.689
C	.290	29.0	3.44	.537
D	.427	42.7	2.34	.370
E	.550	55.0	1.82	.260
F	.649	64.9	1.54	.188
G	.809	80.9	1.24	.0918
H	1	100	1	0

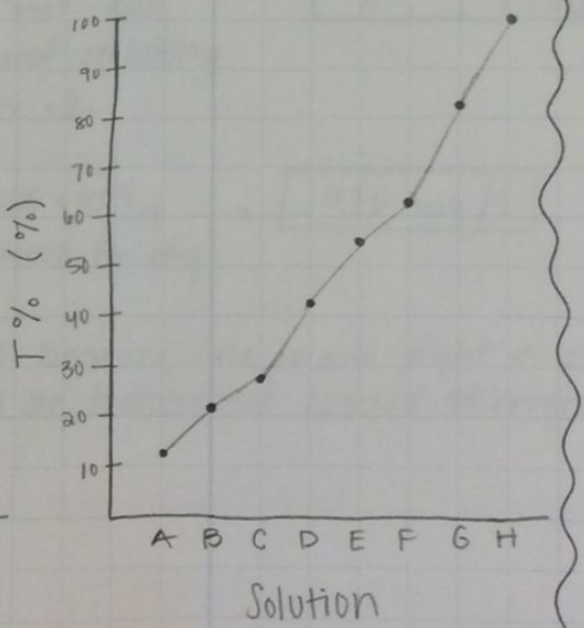
$\frac{A}{-1} = \frac{-\log T}{-1}$

$-A = \log T$

$10^{-A} = T$, $T \times 100 = \%T$

$1/T = 1/T$





5. The dye present in Gatorade is Blue 1 therefore the beverage can be analyzed using the calibration curve.

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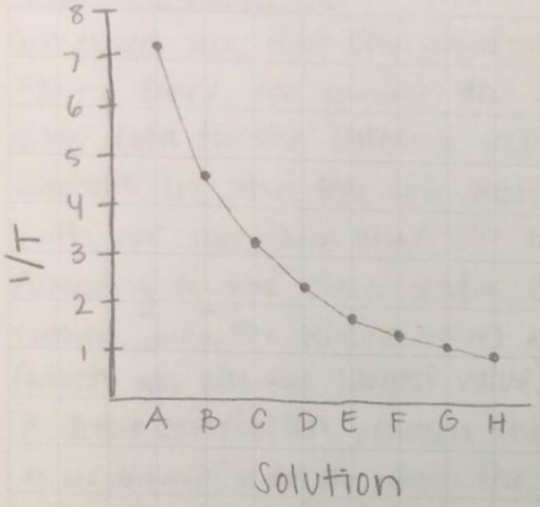

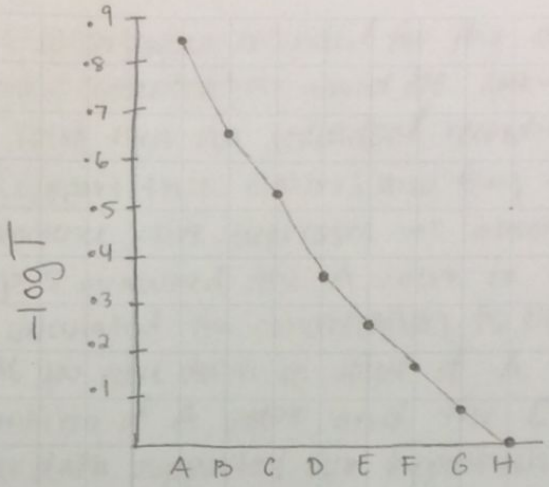

Test	Absorbance
1	.159
2	.149
3	.146
AVG	.151

$A = \varepsilon bc$

$.151 = 130{,}000 \cdot 1 \cdot c$

$.151 \div 130{,}000 = c$

$c = 1.16 \times 10^{-6}\ M$

concentration = $1.16 \times 10^{-6}\ M$

Groups	Avg Absorbance	Concentration
1	.157	$1.21 \times 10^{-6}\ M$
2	.151	$1.16 \times 10^{-6}\ M$
3	.129	$9.92 \times 10^{-7}\ M$
4	.155	$1.19 \times 10^{-6}\ M$
5	.164	$1.26 \times 10^{-6}\ M$
6	.153	$1.18 \times 10^{-6}\ M$
7	.160	$1.23 \times 10^{-6}\ M$
8	.136	$1.07 \times 10^{-6}\ M$

Conclusion Questions

1- We could not use the sports drink at all because initially it does not fall within the .2 - 1.0 range and diluting it would only further it from .2.

2. $\frac{1.16 \times 10^{-6}\ mol}{1\ L} \left| \frac{793\ g}{1\ mol} \right. = 9.20 \times 10^{-4}\ g$ ↳ ×1000 for mg = **.920 mg/L**

3. The relationship is indirect because the more light a solution absorbs, the less light will be transmitted (passed through).

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Claims + evidence

Our claim was that the greater the absorbance recorded for the solution including FD + C Blue 1, the greater the recorded concentration would be. Looking at the class data for the Gatorade testing (and even our individual recordings of the solutions in the Pre-lab Inquiry) support this claim; and they correspond with our sub-claim that the transmittence value decreases as absorbancy increases. According to the class data, Group 5 measured the A value to be .164 (which was the highest value) and calculated the concentration to be 1.26×10^{-6} M (which was also the largest value). As you move down in value of A, you can see a direct correlation between the ranking of A value and the C value ranking; as one decreases, so does the other. The class data supported our hypothesis.

Reading + Reflection

In this lab I finally understood how absorbance is related to 2 important aspects: concentration and transmittance. During the last lab about Beer's Law, I thought I had a relatively clear understanding of concentration vs absorbance. However, when reading the background info, it all made sense when I came across the statement "the intensity of light absorbed depends on the amount of the substance in the solution" (ChemFax! ¶ 2). Because of this, a highly concentrated solution will retain a deeper color therefore more light will be absorbed. It's like the lesson you learn in middle school P.E.: the darker your shirt, the hotter you get because dark colors absorb more light. This results in a direct relationship between concentration and absorbance. On the other hand, transmittance (the % of light that passes/transmits through a solution) is the opposite. By definition (which I had apparently not connected together) transmittance is the light <u>not</u> <u>absorbed</u>. As explained by Cell Biology OLM, "the more a particular wavelength of light is absorbed by a substance, the less is transmitted"; which makes even more sense when you look at a picture that describes the ratio/relationship. Looking back, room for error was in the measurement of the solution's concentration/miscalculating the dilution and by not taking all of the average Gatorade dilutions; both of these affect concentration values.

- "Lab #1 - Analysis of Food Dyes in Beverages - LHS AP Chemistry." ChemFax! Web. 17 Mar. 2016.
- "Spectrophotometry: Transmittance and Absorbance | Cell Biology Olm." *Spectrophotometry: Transmittance and Absorbance / Cell Biology Olm.* Web. 17 Mar. 2016.

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