Chem115 Fall 2023 - Ilana Berlin/Lab2: Beer's Law Experiments: How much B12 is in a Tablet?/LabReport2

Jason Cody - Sep 10, 2023, 8:51 PM CDT

Assignment #4 - LabReport2

You cannot edit this entry after it is graded.

Description	Lab report using template.
I worked in a group with	
The work for this assignment is in	My notebook

Grade **9 / 10**

Graded on Sep 10, 2023, 8:51 PM CDT

Jason Cody - Sep 01, 2022, 2:23 PM CDT

TITLE: *(insert experimental title here. All italicized text in parentheses should be followed and then deleted throughout this template).*

Purpose: *(insert experimental purpose here).*

Reference: Kauley, L. J., *Introduction to Chemistry in the Laboratory*, 20th Ed., Lake Forest College, **2021**, Experiment xx, Appendix xx. *(Edit the experiment title and/or appendix letter; add other references, if used, following the same format).*

Observation and Data: *(Write your clear, concise, complete, past tense, passive voice description or narrative of the experiment as the experiment is performed. Complete sentences are used throughout.*
If needed, insert tables and edit the header: Table 1. Preparation of Standard Solutions. If needed, insert figures and edit this caption below the figure: Figure 1. Beer's Law Plot of B12 Standard Solutions at λ = 520 nm. Number tables and figures in order of appearance in the report.)

Calculations: *(insert sample calculation here, if relevant. Otherwise, delete this section entirely).*

Conclusion: *(restate the quantitative values (percent error and/or CV) to indicate how well the goals of the experiment have been met; answer any questions in the experimental instructions, too).*

ReportTemplate.docx (14.6 kB)

Jason Cody - Sep 10, 2023, 8:51 PM CDT

Calculating B12 Concentration Using Beer's Law

Purpose The purpose of this lab is to calculate unknown concentration (in mg/mL) of B12 tablet. A UV-vis spectrometer and Beer's Law will be used to calculate concentration. How will the results be evaluated?

Reference

Kateley, L. J., Introduction to Chemistry in the Laboratory, 20th Ed., Lake Forest College, 2019, Experiment 2, Beer's Law, Appendix B. OK, but could just list both appendices here (Appendices B, C.) and have only one entry. Also, please keep the formatting (bold, italics, etc.).

Kateley, L. J., Introduction to Chemistry in the Laboratory, 20th Ed., Lake Forest College, 2019, Experiment 2, Beer's Law, Appendix C.

Data & Observations Vial 6, containing an unknown concentration of B12, is a similar color to vial 3, with a concentration of 0.0535 mg/mL of B12. All samples will be scanned by a microLab UV-vis spectrometer, model number FS-528, that was made in the United States, located on the lab table. OK, which one? Running all known concentration solutions through the spectrometer gave an equation of A (absorbance) = 4.8467x +0.0764 and R^2 = 0.9743. OK Running the unknown sample through the spectrometer shows an absorbance of 0.388. Calculation concentration based on standard curve gives a concentration of 0.0643 mg/mL. OK

~~(Here is where you should enter your observations as you complete the experiment. The instructions guide you with italics what should be entered here. Use complete sentences and passive voice.~~

~~You might need to add a table here to organize your data. Be sure to number and title tables and figures.~~

Whenever you include a table, please add a number and title.

Vial Number	Volume of B12 solution (µL)	Volume of H20 (µL)	Concentration (mg/mL)	Absorbance (A)
Vial 1	0	3000	0	N/A
Vial 2	750	2250	0.0263	0.236
Vial 3	1500	1500	0.0535	0.303
Vial 4	2250	750	0.0788	0.426
Vial 5	3000	0	0.105	0.618
Vial 6	N/A	N/A	0.0643	0.388

Calculations (Show a sample of each type of calculation here. You might need the equation editor.)

A = 4.8467x + 0.0764

0.388 = 4.8467x + 0.0764

0.312 = 4.8467x

x = 0.0643 mg/mL

0.0643mg/mL x 10 mL = 0.643 mg = 643 mcg OK, but mcg is the non-scientist abbreviation for microgram. Please use µg.

R^2 = 0.9743 OK

weight of B12/total weight of tablet = % of tablet that is B12

0.643mg/302.3mg = 0.00213 = 2.13 x 10^-3

Percent Error = 100 x [(Experimental - actual)/actual]

100 x [(643-500)/500]

Percent error = 28.6% OK

Conclusions

Beer's Law states that solutions with higher concentrations will have a higher life absorbance. Absorbance equals path length times concentration times a proportional consent. The percent error of this experiment is 28.6%. Experimental error may have come from measurement errors and lose of substance during transfer. The tablet claims to have 500 mcg of B12 however according to my calculations the tablet actually contains 643mcg. The excess may be because B12 decays over time so by the expiration date of the tablet it may contain closer to 500 mcg of B12. OK, but what about the

cloudy meniscus from last week when you prepared the tablet solution? The mass in my tablet of B12 was consistent with other class members calculations. The calculated concentrations were generally 100 - 200 mcg higher than the tablet claimed. Other ingredients in the B12 tablet include cellulose gel, maltodextrin, croscarmellose sodium, and magnesium stearate. OK