Report for Chem 101 Laboratory Exercise #4
Spectrophotometric Determination of Salicylic acid[1]

Using Microsoft Word, students are to insert responses in all yellow highlighted areas. It is recommended that the report be completed without changing font size, column width, row width, margins, and highlights. The completed report must be uploaded to the CHEM 101 Brightspace site as a .pdf file by the due date posted on Brightspace. All answers must be the student's own work without assistance from others. Only reports which are completed using the template will be marked.

Name: Lab Section: Quad: Date:

Abstract

The % mass of salicylic acid in an acne cleanser produced by Johnson & Johnson, was determined to be 0.054% by measurement of the absorbance that was determined from a calibration curve. This was found to be 3.8% of the advertised value.

Data/Results

Table 1. Experimentally measured absorbances (A) and calculated concentrations (conc) for the standard salicylic acid solutions. *The observed data inserted in this table must be consistent with the observed data written in your laboratory notebook with the correct units.*

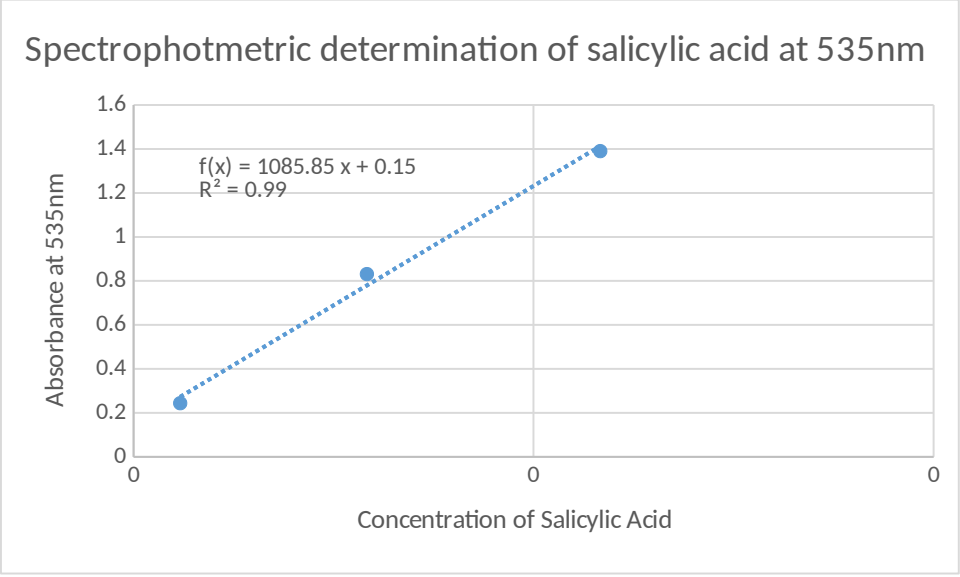
	conc	
Stock salicylic solution	0.002917M	
	A	conc
standard solution #1	0.244	0.00011668M = 1.17x10^(-4)M (with sig figs)
standard solution #2	0.831	0.0005834M = 5.83x10^(-4)M (with sig figs)
standard solution #3	1.390	0.0011668M = 1.167x10^(-3)M (with sig figs)

Table 2. Determination of the amount of salicylic acid in the acne cleanser. *The observed data inserted in this table must be consistent with the observed data written in your laboratory notebook with the correct units.*

Volume of acne cleanser used in the analysis	**0.3mL**		
	Acne cleanser aliquot #1	Acne cleanser aliquot #2	Acne cleanser aliquot #3
Absorbance	**1.196**	**1.207**	**1.189**
[salicylic acid] from curve	**0.0009668M**	**0.0009772M**	**0.0009608M**
Moles of salicylic acid	**2.4 x10^(-5) moles**	**2.4 x10^(-5) moles**	**2.4 x10^(-5) moles**

in 25.00 mL			
Mass of salicylic acid in 25.00 mL	**0.0033g**	**0.0045g**	**0.0033g**
Mass of salicylic acid in 1.00 mL of acne cleanser	**0.00013g**	**0.00018g**	**0.00013g**
%mass of salicylic acid in acne cleanser	**0.048%**	**0.066%**	**0.048%**
% comparison to advertised value	**3.8%**		

Calibration curve for standard solution of salicylic acid *(cut and paste from Excel)* **and determination of the salicylic acid concentration in an acne cleanser by interpolation**



Algebraic Equations (see page 12 of the Chem 101 lab manual)

Concentration of a standard solution =(moles of standard solution)/(volume of solution)

Moles of salicylic acid in 25.00mL =(molarity of salicylic acid)*(volume of solution)
Weight of salicylic acid in 25.00 mL =(moles of salicylic acid)*(molar mass of salicylic acid)
%RSD of weight of salicylic acid in the acne cleanser ((weight of salicylic acid)-(average weight of salicylic acid))^2 repeat with other trials and add together /(number of trials minus 1) = (square root answer)

Discussion *Respond to the following:*
Explain how the calibration curve was generated and then used to provide a value for the concentration of the salicylic acid solution that was placed in the spectrophotometer (max 4 lines).
The calibration curve is made using multiple different concentrations of a solution and its absorbance. Once the curve made, it can be used to determine an unknown concentration of that solution using the equation of the calibration curve.
1Was the % comparison greater than or less than 100%? Include the actual value in your answer. Give a scientific explanation as to why the value was less than or greater than 100%. Do not give personal (lost some of the solution, hard to see the calibration mark) or that the company cheated us on the quantity but rather take a close look at the experiment and determine from a chemical point of view what could have contributed to the variance (max. 4 lines).

The % comparison was less than 100%. What could have caused the % comparison of 3.8% is other substances in this experiment may undergo chemical reactions altering the molecular structure and affecting its absorbance properties. Environmental factor like temperature, humidity and pressure could affect it, as well as contaminants that might have gotten in it.

Conclusions
The % mass of salicylic acid in an acne cleanser, was determined to be 0.054%. This was 3.8% of the advertised value.

References

1. Reimer, M. et al, *Laboratory Manual, Chemistry 101*, pp. 27-34. (University of Victoria: Victoria, B.C.). Fall **2023.**
2. Clean & Clear blackhead cleaning astringent. Johnson & Johnson, Markham, Ontario, L3R 5L2, 0038C.

Feedback Summary	max.
Pre-lab quiz: Are all responses correct?	4

Laboratory Notebook: Have all data, observations and procedures been recorded?	1
Report: Are all sections completed accurately and correctly?	3
Participation: Did the student come prepared, was time used well in lab and was student engaged in the experiment? Did the students request the TA to check their drawers for completeness before they left the lab and show the TA the email of successful submission?	1
Performance evaluation: Did student follow the safe practice guidelines throughout the whole lab period?	1
Total mark	10