Report for Chem 101 Laboratory Exercise #3
Spectrophotometric Determination of Salicylic acid[1]

Using Microsoft Word, students are to insert responses in all highlighted areas. It is recommended that the report be completed without changing font size, column width, row width, margins and highlights. The completed report, as a pdf, must be uploaded to the Chem 101 CourseSpaces within 2 calendar days of the end of the scheduled lab period.

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Abstract

The % mass of salicylic acid in an acne cleanser [2], was determined to be 1.12% by measurement of the absorbance that was interpolated on a calibration curve. This was found to be 112% 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.*

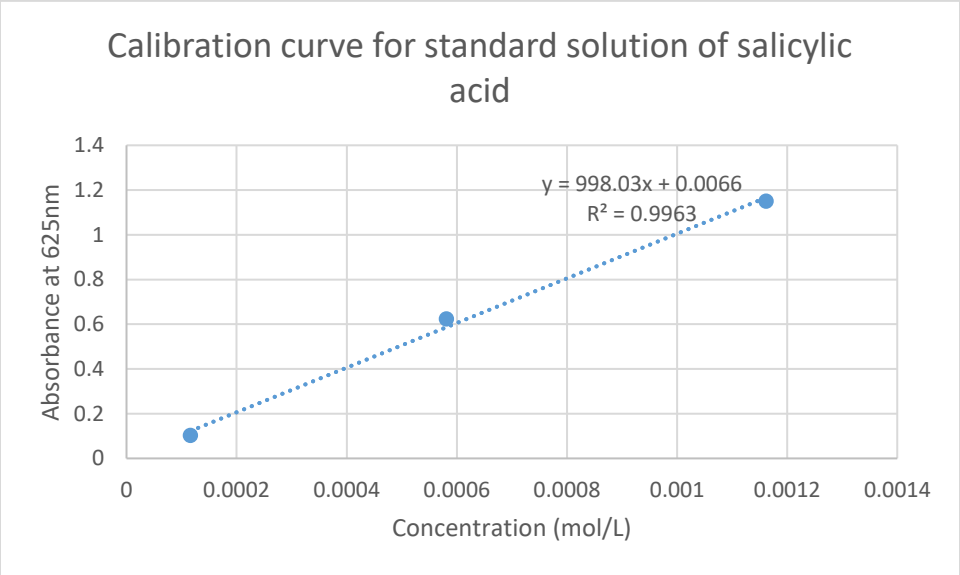
	conc	
Stock salicylic solution	0.002 905M	
	A	conc
standard solution #1	0.102	1.16×10^{-4}
standard solution #2	0.623	5.81×10^{-4}
standard solution #3	1.150	1.162×10^{-3}

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		**0.30mL**	
	Acne cleanser aliquot #1	Acne cleanser aliquot #2	Acne cleanser aliquot #3
Absorbance	**0.811**	**0.811**	**0.805**
[salicylic acid] from curve	**8.06×10^{-4}**	**8.06×10^{-4}**	**8.00×10^{-4}**

Moles of salicylic acid in 25.00 mL	**$2.02x10^{-4}$**	**$2.02x10^{-4}$**	**$2.00x10^{-4}$**
Mass of salicylic acid in 25.00 mL	**$2.79x10^{-2}g$**	**$2.79x10^{-2}g$**	**$2.76x10^{-2}g$**
Mass of salicylic acid in 1.00 mL of acne cleanser	**$1.12x10^{-3}g$**	**$1.12x10^{-3}g$**	**$1.10x10^{-3}$**
%mass of salicylic acid in acne cleanser	**1.12%**	**1.12%**	**1.10%**
% comparison to advertised value	**112%**	**112%**	**110%**

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 11 of the Chem 101 lab manual)

Concentration of a standard solution = $\frac{mol}{L}$

Moles of salicylic acid in 25.00mL = $conc.of\ salicylic\ acid\ \times\ 0.25L$

Weight of salicylic acid in 25.00 mL = $138.121 \times moles\ of\ salicylic\ acid\ in\ 25.00mL$

%RSD of weight of salicylic acid in the acne cleanser $\frac{\sqrt{\sum |x-\bar{x}|^2}}{\frac{\sqrt{n-1}}{\bar{x}}} \times 100\%$

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 was generated using the three standardized solutions of different concentrations which gave a formula in the form y = mx + b where y was the absorbance and x was the concentration. Using this formula it was possible to find a value for the concentration of the salicylic acid.

Was 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 greater than 100% the actual value was 112%. The variance may have been caused by using the same cuvette for each solution. Even though the cuvette was rinsed three times in between each solution there still could have been some leftover solution. This was indicated by the blank measuring an absorbance of 0.020 after testing the standards.

Conclusions

The % mass of salicylic acid in an acne cleanser, was determined to be 1.12%. This was 112% of the advertised value.

References

1. Reimer, M. et al, *Laboratory Manual, Chemistry 101*, pp. 29-35. (University of Victoria: Victoria, B.C.). **Fall 2019**.
2. Johnson and Johnson, *Blackhead cleaning astringent, Clean and Clear,* 1% salicylic acid

Feedback Summary	max.
Pre-lab quiz: Are all responses correct?	3
Laboratory Notebook: Have all data, observations and procedures been recorded?	1
Report: Are all sections completed correctly?	1

Participation: Did the student come prepared, was time used well in lab and was student engaged in the experiment?	1
Performance evaluation: Did student follow the safe practise guidelines?	1
Total mark	7