

Report for Chem 101 Laboratory Exercise #3

Spectrophotometric Determination of Salicylic acid¹

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.

Name: Lab Section: Quad: Date: **16/10/2018**

Abstract

The % mass of salicylic acid in an acne cleanser **by Johnson & Johnson**, was determined to be **0.87%** by measurement of the absorbance that was interpolated on a calibration curve. This was found to be **87%** 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.*

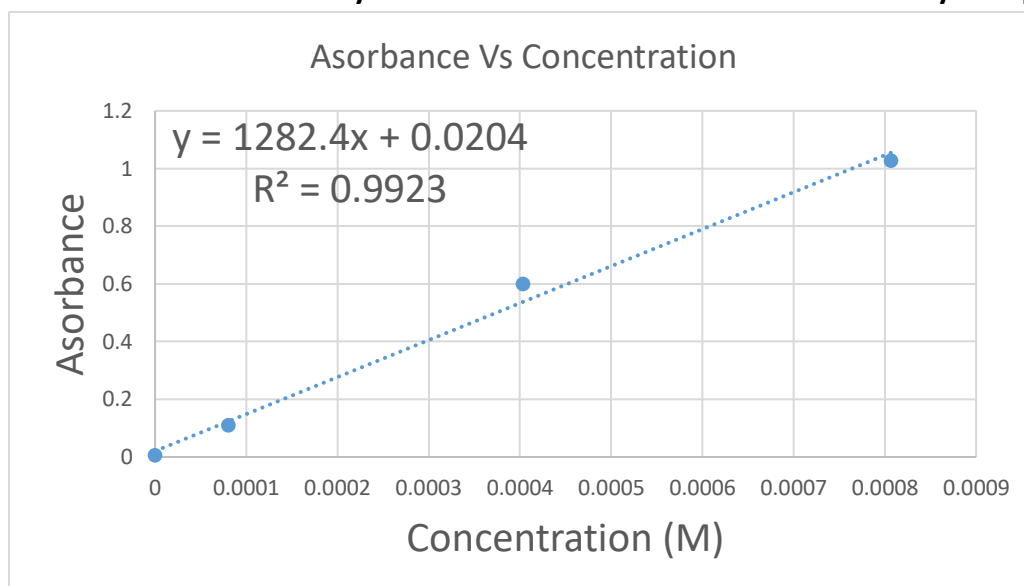
	conc	
Stock salicylic solution	0.002017 M	
	A	conc
standard solution #1	0.108	0.00008068 M
standard solution #2	0.599	0.0004034 M
standard solution #3	1.026	0.0008068 M

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
A	0.961	0.962	0.962
[salicylic acid] from curve	7.33E-4 M	7.34E-4 M	7.34E-4 M

Moles of salicylic acid in 25.00 mL	1.834 mol	1.836 mol	1.836 mol
Mass of salicylic acid in 25.00 mL	2.532E-3	2.534E-3 g	2.534E-3 g
Mass of salicylic acid in .30 mL of acne cleanser	0.29 g	0.29 g	0.29 g
%mass of salicylic acid in acne cleanser	0.88%	0.87%	0.87%
% comparison to advertised value	88%	87%	87%

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 = $(0.002017 \text{ M}) V_i = C_f V_f$ where V_i is the initial volume of the salicylic acid in mL C_f is the final [salicylic acid] in M and V_f is the final volume of the solution in mL

Moles of salicylic acid in 25.00mL = $(25.00\text{mL}) \times (10\text{E-}3 \text{ L/1 mL}) \times (z \text{ mol/L})$
 where z is the [salicylic acid] in mol

Weight of salicylic acid in 25.00 mL = $(z \text{ mol}) \times (138.1 \text{ g/1 mol})$

Where z is the moles of salicylic acid in 25.00 mL

%RSD of weight of salicylic acid in the acne cleanser $\%RSD = (s/\bar{x}) \times 100\%$ where s = the standard deviation of the weight of salicylic acid in the acne cleanser and \bar{x} is the average of the weight of salicylic acid found in the acne cleanser

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).

-Plotted data points of absorbance vs concentration (M) for the standards in excel

- Used the equation $y = 1282.4x + 0.0204$ where y is absorbance and x is concentration in M to extrapolate the concentration of salicylic acid in the cleanser.

-This concentration was found to be on average $7.34E-4$ M

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 on average was 87%. Some factors that could have contributed to this would be the salicylic acid used was not pure, the cleanser may have had another solution (such as H₂) added to it) to dilute the solution,

Conclusions

The % mass of salicylic acid in an acne cleanser, was determined to be 0.87%. This was 87% of the advertised value.

References

1. Reimer, M. et al, *Properties of Materials, Laboratory Manual, Chemistry 101*, pp. 29-35. (University of Victoria: Victoria, B.C.). Fall 2018.
2. Clean & Clear
Blackhead cleaning Astringement
Johnson & Johnson inc
Markham, ON, Canada, L3R 5L2
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Feedback Summary	max.
Pre-lab quiz: Are all responses correct?	3
Laboratory Notebook: Have all data and observations been recorded?	1
Report: Are all sections completed?	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 safety guidelines?	1
Total mark	7