

# SPECTROPHOTOMETRIC ANALYSIS OF ASPIRIN

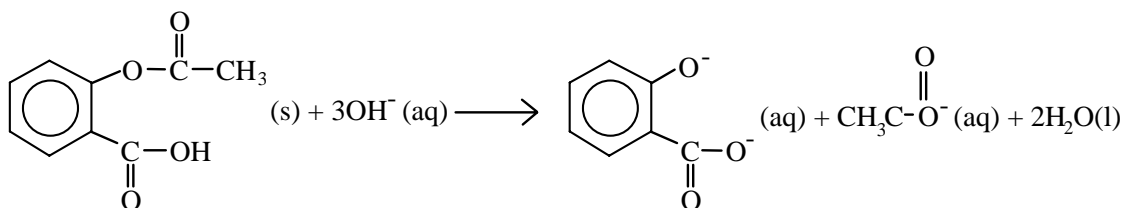
## LAB VIS 4

From Juniata College SIM

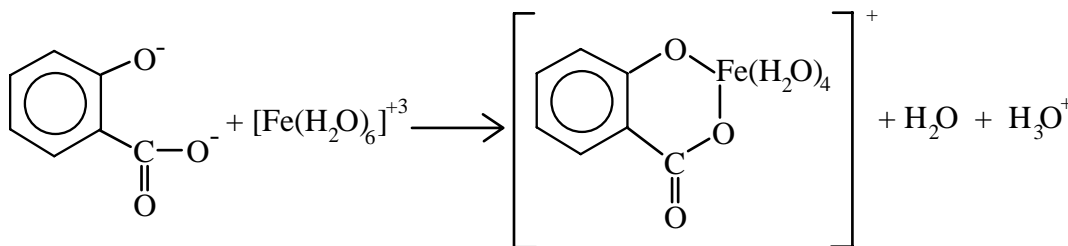
## INTRODUCTION

A colored complex is formed between aspirin and the iron (III) ion. The intensity of the color is directly related to the concentration of aspirin present, therefore, spectrophotometric analysis can be used. A series of solutions with different aspirin concentrations will be prepared and completed. The absorbance of each solution will be measured and a calibration curve will be constructed. Using the standard curve, the amount of aspirin in a commercial aspirin product can be determined.

The complex is formed by reacting the aspirin with sodium hydroxide to form the salicylate dianion.



The addition of acidified iron (III) ion produces the violet tetraaquosalicylatroiron (III) complex.



## PURPOSE

To determine the amount of aspirin in a commercial aspirin product.

## EQUIPMENT / MATERIALS

1- 125 mL erlenmeyer flask( 6 if preparing standards	commercial aspirin product
10 mL graduated cylinder	acetylsalicylic acid ( if preparing standards)
250 mL volumetric flask	1 M NaOH
Hot Hands or Crucible Tongs	0.02 M iron (III) buffer
5 mL pipet and filling bulb	Spectrophotometer
Mortar and pestle	

## SAFETY:

- Always wear goggles and an apron in the lab.
  - *Be careful while boiling the sodium hydroxide solution. NaOH solutions are dangerous, especially when hot.*

## PROCEDURE

Preparing the Standards (if not provided)

1. Mass 400 mg of acetylsalicylic acid in a 125 mL Erlenmeyer flask. Add 10 mL of a 1 M NaOH solution to the flask and heat to boiling.
2. Quantitatively transfer the solution to a 250 mL volumetric flask and dilute with distilled water to the mark.
3. Pipet a 5.0 mL sample of this aspirin standard solution to a 100 mL volumetric flask. Dilute to the mark with the 0.02 M iron (III) buffer solution. Label this solution "**A**".
4. Prepare similar solutions with 4.0, 3.0, and 2.0mL portions of the aspirin standard. Label these "**B**, **C**, and **D**."

Unknown and Blank

5. Using a commercial aspirin product, follow steps 1 through 3. Label the final solution by brand. This is the "**unknown solution**".
6. Fill the one of the cuvettes about 3/4 full with 0.02 M iron (III) buffer. This is the "**blank cuvette**".
7. Fill one of the other cuvettes about 3/4 full with solution **A**.
8. Set the spectrophotometer to 530 nm.

*Spectrophotometric Analysis of Aspirin*

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9. Place the blank cuvette into the sample compartment of the spectrophotometer.

**Note:** Before inserting a cuvette into the spectrophotometer, wipe it clean and dry with a kimwipe, and make sure that the solution is free of bubbles. Do not touch the clear sides of the cuvette. Ensure that the cuvette is always inserted into the holder so that the light path passes through the same part of the cuvette every time.

10. Press 0 ABS 100%T.

11. Remove the blank cuvette from the instrument.

12. Place the cuvette containing solution **A** into the spectrophotometer. Make sure that the triangle on the cuvette is facing the front of the instrument.

13. Record the absorbance of solution **A** in the Data Table.

14. Remove the cuvette containing solution **A** from the instrument.

15. Repeat steps 12 – 14 for solutions **B**, **C**, and **D**, and the **unknown solution**.

16. Plot the graph of absorbance of the standards versus the concentration.

17. Determine the concentration of the unknown from the graph using the absorbance measured.

**DATA TABLE**

Solution	Concentration (mg/L)	Absorbance
A		
B		
C		
D		
<i>unknown</i>		

amount of aspirin in unknown \_\_\_\_\_ mg

accepted value \_\_\_\_\_ mg

percent error \_\_\_\_\_ %

**QUESTIONS**

1. Explain why the wavelength of 530 nm was used.
2. How did the concentration of your aspirin solution compare to the accepted value?
3. Is it better to buy generic or brand name aspirin? Support your conclusion.