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THE QUANTITATIVE DETERMINATION OF THE ASPIRIN CONTENT OF TABLETS USING UV AND VISIBLE WAVE LENGTH SPECTROSCOPY

Ravindra Khadak*[1], Rekha Birle[2], Dr. Nandu Kayande[3], Dr. Pankaj Kushwah[4]

Thakur Shivkumar Singh Memorial Pharmacy College (ziri) Burhanpur, India.

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***Corresponding Author**
Ravindra Khadak
Thakur Shivkumar Singh Memorial Pharmacy College (ziri) Burhanpur, India.

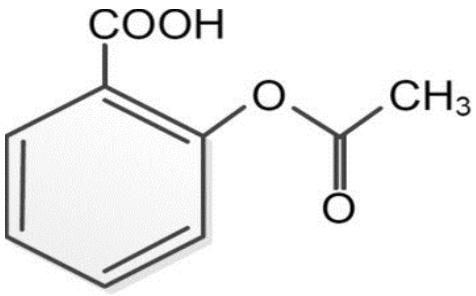
ABSTRACT

The quantitative determination of aspirin method was developed using UV-Vis spectrophotometer for estimation of aspirin pure and aspirin tablet from tablet formulation by percent purity. Two analytical wavelength ranges used were i.e. 302-330nm and 530-550. Aspirin (acetylsalicylic acid) is an important drug used for its analgesic, antipyretic and anti-inflammatory properties. Various analytical techniques such as HPLC, Mass spectroscopy etc are available for the determination of aspirin content in drugs but these methods are expensive and laborious in nature. Therefore, these methods are neither suitable nor accessible for undergraduate students. In this background, we have used a very simple analytical technique to teach students how to determine aspirin contents in various drugs. Using this method the students have successfully determined the aspirin content in commercially available drugs like ASA, Aspesol, Colsprin, Ecosprin and Disprin. The results obtained in the present study were found comparable to data reported elsewhere. Therefore, this study can be used by other research and/or educational institutes to train undergraduate students in drug assay. he aspirin content of commercial tablets is routinely determined using the acid/base titration method described in the British Pharmacopoeia but a large number of alternative instrumental methods are also described in literature. This application note will compare two such spectrophotometric methods. After acidification the resulting salicylic acid can be determined directly from its absorption maxima at 302nm (Method 1) or it can be derivatives with Fe(III) to produce a violet coloured complex that can be quantified at its absorption maxima of 530nm (Method 2).

KEYWORDS: aspirin, salicylic acid, ecospirin, methanol, ferrous chloride.

INTRODUCTION

Aspirin is a [2-(acetyloxy) benzoic acid.[1] aspirin is broadly used for the treatment of fever, inflammatory diseases, pain and blood thinner to prevent blood clots.[2] It is unique among Cox-inhibitors (cyclooxygenase) because it covalently modifies the proton of enzymes and irreversibly inhibits them. Aspirin was first isolated by Felix Hoffmann, a chemist with the German company Bayer in 1897. The name „aspirin‟ comes from the „a‟ in acetyl chloride, the„spir‟ from the old botanical name for meadowsweet, Spiraea ulmaria (known to contain salicylic acid) and „in‟, which was a then familiar name ending for medicines.[3] ASP along with its main and active degradation product salicylic acid (SA) has been studied for decades. Basically, once ASP is ingested, it is immediately hydrolyzed to SA, which is responsible for the pharmacological activity.[4] The aspirin content of commercial tablets is routinely determined using the acid/base titration method described in the British Pharmacopoeia[5] The UV spectro photometric analyses are often preferred in quality control testing and ordinary laboratories due to its broad availability and suitability.[6] Aspirin overdose has potentially serious consequences leading to significant morbidity and death. Patients with mild intoxication frequently have nausea and vomiting, abdominal pain, lethargy, ringing in the ears, and dizziness.[7] It is an analgesic and is also used in the treatment of patients having acute coronary syndromes and also in ischemic stock[8] For ASP stability monitoring in tablets, ultraviolet (UV) detector has been found to be fit for the purpose as it is suitable to accurately measure in the microgram order,[9] few methods were reported for the simultaneous determination of Aspirin and other drugs including combination of liquid chromatographic and mass spectrometric detection.[10] here are several analytical methods for the analysis of various drugs from bulk and various formulations like tablets, capsules, injections, etc. Literature survey revealed various analytical methods have been reported for estimation of aspirin.[11]



Acetyl salicylic acid (Aspirin)

Selection of wavelength ranges: UV –visible range 200 to 800 nm. Based on spectra obtained, the wavelength range selected for aspirin was 302-330 nm in method (I) and for visible, range of aspirin was 530-550 nm.

EXPERIMENT METHODS

Method 1

Take 25mg of Aspirin in 100ml volumetric flask and dissolving 19.2mg of salicylic Acid. Then add 0.1 g of citric acid in minimum amount of purified water. This solutions was diluted with 100ml methanol in a beaker. The working standard solution were prepared by pipetting 5, 10 and 20 ml. Then Transfer in 100ml volumetric flask and add 25ml of 0.2M NaoH solution. Diluting the volume with minimum amount of 0.2M HCl Sample Preparation:- Take a single Aspirin tablet and then Weighing in a weighing balance. Then crushing it in a pestle and mortar. Take 50.0ml of Volumetric flask and add equivalent to 25 mg of aspirin. Then 30 ml of methanol was added and after shaking for 2 minutes. The sample Was diluted to volume with methanol in measuring cylinders. Then separate 3 sample in above solution each sample are 5ml. These three sample was transfer in 100 ml volumetric flask and add 25 ml of 0.2 M NaOH solution. After stand for 30 minutes and then each flask was diluted to volume with 0.2M HCl.

Method 2.

Procedure for making 0.025MFeCl3

Weigh 6.8g FeCl3 into a 500 ml volumetric flask and dissolve in 100 ml purified water.add3.0ml of concentrated HCl and 12 .0g of KCl dissolve and dilute to volume with purified water.

Standards preparation

Take a 800mg of aspirin powder was prepared by dissolving 61.0mg of salicylic acid. Then preparing 2ml of 1.0M NaOH solutions in 100.0ml volumetric flask. The solution was then diluted to volume with purified water. Working standard solutions were prepared by pipette 10,8,6,4 and 2ml. Aliquots of the stock standard solutions into separate 100.0ml volumetric flask. Making 0.025.M FeCl3 then diluting to volume with above solutions.

Sample preparation

Take a single Aspirin tablet and weighing in a weighing balance. Then crushing in a pestle and mortar and separate in a three sample. And then quantitatively transfer it to a 250.0ml of

each solutions. Making 10ml of 1.0M NaOH solutions and then add each above solutions. The solution were heated in a water bath then the solution after cooling to room temperature. The sample were diluted to volume with purified water Aliquots of each sample were pipette into three solutions each sample solutions are 5ml. Then each sample were transferred into 100.0ml volumetric flask. And each flask was diluting to volume with 0.025M FeCl3.

Sample Measurement

Aliquots of the sample prepared in both of the described methods were placed into quartz curettes and analysis using a Simartzu spectrophotometer .the photometric mode was acceded by selecting the photometric icon from the main menu screen and measurement were performed according to the procedure described in the instrument operating manual .than calculate the measurement data.

RESULT AND DISCUSS

Method 1

The absorbance values of the three working standard solution were measured, the measuredvalues are shown in table.

Methods 1

Table 1: Standard absorbance values.

s.n.	Aspirin in Equivalent conc.{mg/ml}	Absorbance
1	0.0124	0.109
2	0.023	0.123
3	0.0303	0.133

The Aspirin content of the three tablets analysis given in table.

Table 2. The calculated Aspirin content of ecosprin own brand tablets using Methods 1.

Sample	Tablet wt.(g)	Sample wt.(g)	Sample Abs.	Aspirin content of tablet (mg)
1	0.011	0.025	0.299	75.1
2	0.09	0.024	0.301	74.9
3	0.010	0.027	0.294	75.8

Ecosprin own brand tablets are certified to contain 75mg of aspirin in each tablet.analysis of three tablets using Methods 1give an average content of 75.1mg with a standard deviations of1.06 Each tablet that was analysed contain 95.0% to 105.0% of the certified amount, as requiredby the British pharmacopoeia.

Method 2.

The absorbance values of the three working standard solutions were measured, the measured values are shown in **table 3.**

S .N.	Aspirin in Equivalent conc.{mg/ml	Absorbance
1	0.025	0.136
2	0.028	0.244
3	0.032	0.256
4	0.038	0.440
5	0.040	0.680

Table 4. Calculated Aspirin content of ecosprin own brand tablet using Methods.

S.N.	Tablet wt.(g)	Sample wt.(g)	Sample Abs.	Aspirin content of tablet (mg)
1	0.010	0.299	0.026	75.3
2	0.012	0.300	0.029	74.1
3	0.011	0.333	0.31	74.9

Average = 74.3

Std Dev.= 2.46

Ecosprin own brand tablets are certified to contain 75 mg of aspirin in each tablet. Analysis of three tablets using Methods 2 gave an average content of 74.3mg with a standard deviations of2.46. Each tablet that was analyzed contained 95.0% to 105.0% of the certified amount, as required by the British pharmacopoeia.

SUMMARY AND CONCLUSION

The proposed method is simple, precise, accurate, and selective for the estimation of aspirin in bulk and in tablet dosage forms. The method is economical, rapid and do not require any sophisticated instruments. Hence it can be effectively used for the routine analysis of aspirin in bulk and in tablet dosage forms. I am determine aspirin tablets used in this application Nate contained 74.4 mg of aspirin per tablet when it was tested by the manufacturer. The two analysis methods in this application assays results that were in agreement with this value, although Methods 2 gave a broader range of results{5mg/tablet}than method 1 {2.1mg /tablet}. Further work would be needed to determine if the references in the results were due to there selective analytical methodologies used in each method or normal random variations in the aspirin content of the individual tablets.

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