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A method of assay for the estimation of sulphadimidine in tablets

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ABSTRACT: A simple and rapid titrimetric method (Back Titration) was used in the assay of Sulphadimidine in commercial tablets. The method involves alkaline hydrolysis of Sulphadimidine to form the corresponding acid. This was followed by back titration of the excess alkali using phenolphthalein as indicator. The results of this assay method were compared with those obtained from the official nitrite titration method. Both methods yielded similar results with high percentage recoveries. The proposed method gave results that agree well with the labeled contents.

Keywords: Sulphadimidine assay, Back titration, Commercial tablet s.

Introduction

Sulphadimidine, chemically known as N^1–(4, 6-dimethylprymidin–2-yl) sulphanilamide, belongs to sulphonamide. It is an antibacterial (intestinal drug)[1]. The structure is given in Figure 1.

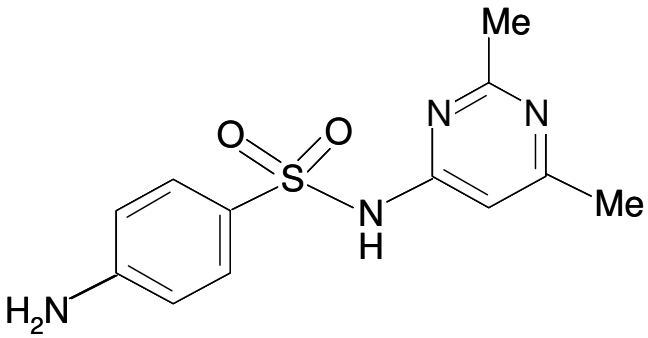

Figure 1: Chemical Structure of Sulphadimidine

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Sulphadimidine is bacteriostatic. Sulphadimidine competitively inhibits the incorporation of para-aminobenzoic acid into folic acid normally synthesized by bacteria. Sulphadimidine acts specifically as a competitive inhibitor of the enzyme responsible for the incorporation of para-aminobenzoic acid into dihydropteroic acid which is immediate precursors of the folic acid[2,3].The drug does not affect mammalian cells since these cells require intact folic acid and cannot synthesize them. It is rapidly absorbed from the gastro intestinal tract, so that with regular dosage by mouth the blood concentration can be readily maintained at 5 to 10mg per 100 milliliters. It is often the drug of choice in pneumococcal or streptococcal infection and in *Escherichia coli* infections of the urinary tract[4]. The dosage forms available are: tablet, injection, suspension, and veterinary tablets.[5]

Literature reports reveal that only few analytical methods have been reported for the estimation of Sulphadimidine. They include Nitrite Titration[1], Potentiometric Titration[6], Non-aqueous Titration[7] , Spectrophotometric[8] and electron-capture gas chromatography[9] methods. The official methods for the analysis of the drug in pharmaceutical preparations are the Potentiometric and Nitrite Titrations[1].

The end point Nitrite Titration method is detected either electrometrically or by using an external indicator. By streaking a few drops of the titrated solution upon starch iodide paper or paste a dark blue colour is obtained. Excess nitrous acid oxidizes the iodide in the indicator to iodine which gives the blue colour with starch.

The disadvantage of this method is that the visual end point with external starch iodide indicator may seem somewhat indefinite and difficult to determine. The great disadvantage of the electrometric end point and the Potentiometric Titration is lack of specificity. They also require expensive equipments, some level of expertise and are time-consuming. The average time to complete the reaction requires about 2 hours.

However, the proposed method can be completed within 20 minutes. The reagents are also readily available. This present work describes simple Titrimetric method (Back Titration) for the determination of Sulphadimidine from its pharmaceutical preparation.

Materials and Methods

Materials and Reagents:

Sulphadimidine B.P. and Samidine Tablets were obtained from Sam Pharmaceuticals. Different commercial brands of Sulphadimidine Tablets were purchased from Pharmacy shops. Lactose B. P., Talcum powder, corn starch, Magnesium Stearate were obtained from RAJRAB Nig. Ltd. Ilorin, Nigeria

All reagents and solvents used were of analytical grade. Freshly distilled water was used throughout.

Methods:

Standard drug solution was prepared by dissolving 250mg of Sulphadimidine B. P. in 30ml ethanol (96%) in a 250ml conical flask. 40ml of 0.1M sodium hydroxide solution was then added.

The content of the flask was mixed well and warmed on water bath for 5 minutes. It was allowed to cool. The excess alkali was then titrated with standardized 0.1M hydrochloric acid using 3 drops of Phenolphthalein solution as indicator. The operation was repeated without the substance being examined.

The difference between the titrations represents the amount of 0.1M sodium hydroxide required by the Sulphadimidine. Each milliliter of 0.1M sodium hydroxide is equivalent to 0.02783g of $C_{12}H_{14}N_4\ O_{25}S$ (Sulphadimidine).

Determination in Tablets

Twenty tablets were weighed and powdered. A quantity of the powder equivalent to 250mg of Sulphadimidine was dissolved in 30ml of ethanol (96%). The procedure described above for standard drug solution was followed.

The equation for the reaction involved is shown in Figure 2.

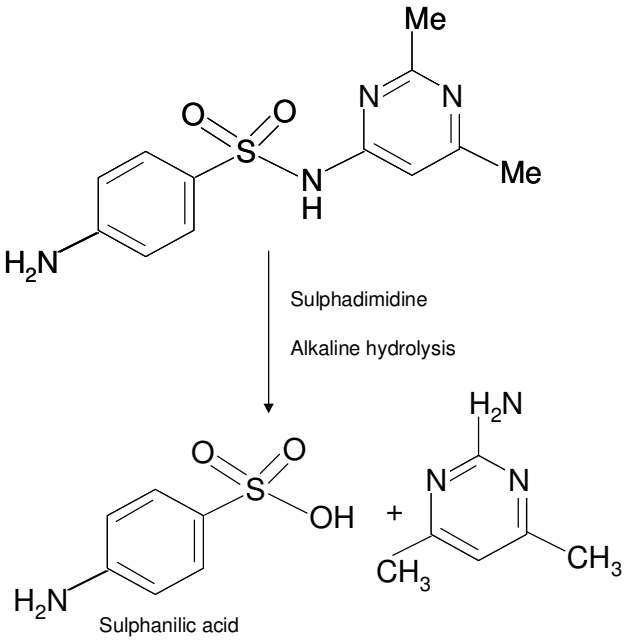

Figure 2: Equation for the hydrolysis of sulphadimidine.

Results and Discussion

Validity of the Method

1. To confirm the validity of the method different known quantities of Sulphadimidine B.P. drug were analyzed. The high percentage recoveries of the drug were obtained using the proposed method. The results are shown in Table 1. An average of eight determinations was carried out for each quantity weighed.
2. Analysis of commercially available tablets was carried out. The results are shown in Table 2. An average of ten determinations was carried out for each sample.
3. To further confirm the validity of the method mixtures containing Sulphadimidine B. P. and common excipients or additives like Lactose, Talcum powder, Magnesium Stearate, and Corn starch were prepared in portions corresponding to those which are used in final dosage. The results are shown in Table 3.

Table 1: Average Recoveries from Sulphadimidine B. P.

TITRIMETRIC METHOD (BACK TITRATION)				REPORTED METHOD (NITRITE TITRATION)		
Quantity Weighed (mg)	**Quantity Found (mg)**	**Recovery (%)**	**Standard Deviation**	**Quantity Found (mg)**	**Recovery (%)**	**Standard Deviation**
250	252.13	100.85	± 0.05	242.80	97.12	± 0.06
300	295.43	98.48	± 0.09	293.43	97.81	± 0.04
350	342.28	97.79	± 0.05	352.18	100.62	± 0.02
400	400.34	100.09	± 0.08	400.28	100.07	± 0.05
450	453.48	100.77	± 0.05	449.20	99.82	± 0.04
500	490.31	98.06	± 0.06	503.23	100.65	± 0.06
550	545.22	99.13	± 0.07	557.46	101.36	± 0.04

(Average of 8 determinations)

Table 2: Average Recoveries from the various commercial samples of Sulphadimidine tablets.

TITRIMETRIC METHOD (BACK TITRATION)				REPORTED METHOD (NITRITE TITRATION)		
Labeled Amount (mg)	**Quantity Found (mg)**	**Recovery (%)**	**Standard Deviation**	**Recovery (mg)**	**Recovery (%)**	**Standard Deviation**
500	498.98	99.80	± 0.06	496.24	99.25	± 0.07
500	495.43	99.09	± 0.09	490.83	98.17	± 0.05
500	493.43	98.69	± 0.10	500.00	100.00	± 0.06
500	500.18	100.04	± 0.08	494.56	98.91	± 0.03
500	499.24	99.85	± 0.03	492.48	98.50	± 0.02

(Average of 10 determinations)

Table 3: Average Recoveries of Sulphadimidine in the mixtures of various amounts of Sulphadimidine and Excipients.

TITRIMETRIC METHOD (BACK TITRATION)					REPORTED METHOD (NITRITE TITRATION)		
Sulphadimidine Weighed (mg)	Total Excipients Weighed (mg)	Recovery of Sulphadimidine (mg)	% Recovery of Sulphadimidine	Standard Deviation	Recovery of Sulphadimidine (mg)	(%) Recovery of Sulphadimidine	Standard Deviation
100	10	99.23	98.23	± 0.06	98.58	98.58	± 0.06
200	20	200.00	100.00	± 0.04	199.76	99.88	± 0.04
300	40	298.13	99.38	± 0.05	296.84	98.95	± 0.05
400	80	403.84	100.96	± 0.06	400.14	100.04	± 0.08
500	100	492.43	98.49	± 0.08	500.00	100.00	± 0.10

The result obtained by the proposed and reported methods for the weighed Sulphadimidine B. P. and commercial samples of Sulphadimidine tablets are given in Tables 1 and 2. The percentage recoveries show that the proposed method can be adopted for routine analysis of Sulphadimidine tablets. The results obtained by the proposed method were in good agreement with the labeled amount. It can be observed from Table 3 that when mixtures containing Sulphadimidine and common excipients were prepared, the mixtures gave high percentage recoveries. The results showed that the excipients did not interfere during the titration process. The values also compared well with those obtained by reported methods.

Conclusion

This proposed method recovery was sensitive, time-saving , precise, reproducible and simple. The reagents employed are inexpensive and readily available. The method is suitable for routine assay of Sulphadimidine in pure and dosage forms as an alternative to the official and existing methods.

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