A Ring-Oven Method for the Routine Analysis of Salicylamide in Pharmaceutical Preparations

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Summary: A ring-oven method has been described by which salicylamide can be determined in pharmaceutical preparations also containing paracetamol and caffeine as co-constituents. The simplicity, accuracy and sensitivity of the method recommend it to be effectively used in routine testing.

Introduction

Salicylamide is widely used as an analgesic, antipyretic and antirheumatic in medicine. In view of its importance there is a need for a quick, convenient, precise and accurate metod of its determination in pharmaceutical preparations. With this aim in view, an attempt has been made to devise a new method based on the use of the Weisz – Ring Oven Technique and the results of this investigation have been reported in this communication. Salicylamide reacts with aminoantipyrine and ferricyanide to give red colour (1). This reaction has been made the basis of these studies. The method standardized and as reported here has been successfully used for the determination of salicylamide not only in a synthetic mixture but also in commercially available preparations.

Experimental

Reagents

Salicylamide solutions. Stock solution of salicylamide was prepared by dissolving exactly 0.2 g of the substance (Polish made) in 100ml double distilled water. The working standard solution containing 200 ng of the substance per μl was prepared by exact dilution of the above and was used as unknown to standardise the method. Standard solutions for the segment technique (2) were prepared also from the stock solution by exact dilution so as to contain 20.00, 40.00, 80.00, 120.00, 160,00 and 200.00ng of salicylamide per μl.

Hexacyanoferrate(III) solution. A solution was prepared by dissolving 2.0g potassium hexacyanoferrate(III) (Merck) in 5ml of 1.0N sodium hydroxide and diluted to 100.0ml with distilled water.

Aminoantipyrine. A 0.2% solution of aminoantipyrine (Koch-Light, England) prepared in distilled water was employed for these experiments.

Paracetamol. A 0.2% aqueous solution of paracetamol (Schazoo Laboratories, Lahore, Pakistan) diluted to contain 80.00ng per μl was used.

Synthetic mixture. A synthetic aqueous solution containing 120.0ng per μl each of salicylamide and paracetamol and 12.0ng per μl caffeine was prepared by dissolving exactly weighed amounts of these mixture constituents.

Caffeine. And aqueous solution of caffeine containing 80.00ng per μl was prepared from the substance (Merck) and used as such.

Malidens. Malidens tablet by Aspro-Nicholas, Pakistan, according to the analysis given on its wrapper contains: Salicylamide 250.0mg, Paracetamol 250.0mg and Caffeine 25.0mg.

0.0552g exactly weighed from the maliden tablet were dissolved in 100ml of double distilled water. The solution was set aside to allow the fillers (usually starch) to settle down. This solution, according to the above analysis, contained 200.0ng, 200.0ng and 20.0ng per μl of salicylamide, paracetamol and caffeine respectively. The so prepared solution was further exactly diluted to contain 80.0ng per μl of salicylamide, 80.0ng per μl paracetamol and 8.00ng per μl caffeine and was used during these studies.

Apparatus

The Weisz-Ring Oven with 110°C working temperature, automatic filling micropipettes of 1μl and 5μl capa-

city (Karl-Kolb Scientific and Technical supplies, Buchschlag, Frankfurt, BRD) and Whatman filter paper No: 41 were used for these experiments.

All other reagents used were also of analytical grade or equivalent purity and glass-ware used was also A-grade, officially calibrated.

Procedure

The following procedure as reported earlier (2-4) was adopted. 1 μl of each of the unknown solutions and the two different standard solutions were spotted at three points marked around the centre of the filter paper so as to make an equilateral triangle, 5 μl of the potassium ferricyanide solution was applied to the centre of this paper and washing was done in the usual way from centre to the ring zone to get three sharply out-lined segments, each about 10-20mm long. The filter paper was then sprayed directly with aminoantipyrine solution. After about 20 seconds a sharp red colour appeared at the circumference of the ring in three clear segments. About 5-6 washings with distilled water were sufficient to wash the reaction product to the ring zone. The unknown solution was evaluated for its exact strength following the usual prcedure of comparing the colour intensity of the test segment with that of the standard segments (4). In order to achieve higher accuracy one or two more determinations were carried out.

The effect of interferences on the determination of salicylamide before investigating Malidens solution was examined following the usual method (4).

The synthetic mixtures and solution made from the commercially available Malidens tablets were also evaluted following the above described method standardised by us.

Results and Discussion

The results represented in Tables I to III confirm that the method described here is quite reliable and practicable. Since the colour of the reaction product is unstable and fades within 2-3 hours, therefore, the stan-

Table I

Determination of Salicylamide by the Ring- Oven Method.

No.	Amount given ng	Amount found ng	Error %
1.	10.00	10.70	+ 7.00
2.	20.00	20.00	± 0.00
3.	40.00	37.00	− 7.60
4.	50.00	53.00	+ 6.00
5.	60.00	63.00	+ 5.00
6.	70.00	74.00	+ 5.70
7.	100.00	107.00	+ 7.00
8.	150.00	160.00	+ 6.66
9.	180.00	190.00	+ 5.55
10.	400.00	390.00	− 2.50

Table II

Effect of Paracetamol and Caffeine on the Determination of Salicylamide

No.	Salicylamide given ng	Interfering substance ng		Salicylamide found ng	Error %
1.	80.00	80.00		80.00	± 0.00
2.	80.00	240.00	Paracetamol.	80.00	± 0.00
3.	80.00	320.00		80.00	± 0.00
4.	80.00	80.00		80.00	± 0.00
5.	80.00	240.00	Caffeine	80.00	± 0.00
6.	80.00	260.00		80.00	± 0.00
7.	80.00	1.60μg		80.00	± 0.00

Table III
Determination of Salicylamide in:

a) Synthetic mixture

Salicylamide given ng	Paracetamol given ng	Caffeine given ng	Salicylamide found ng	Error %
120.00	120.00	12.00	120.00	±0.00
120.00	120.00	12.00	120.00	±0.00
120.00	120.00	12.00	120.10	+0.08
120.00	120.00	12.00	119.95	–0.04

b) Malidens tablets

Salicylamide given mg	Paracetamol given mg	Caffeine given mg	Salicylamide found mg	Error %
250.00	250.00	25.00	250.00	±0.00
250.00	250.00	25.00	250.00	±0.00
250.00	250.00	25.00	250.02	+0.01

dard scale method cannot be used for routine analysis. Alternatively the segment technique has been used because here the stability of the colour of the end product is not desired for a longer period. It is observed that aminoantipyrine solution gives good results when it is sprayed on the final ring as opposed to applying it to individual drops before washing them out on the ring-oven. Moreover, potassium ferricyanide gives much better results with convenience of washing when it is applied to the centre of the paper and then washed out. In our experience salicylamide solution stored for more than three weeks should not be used because the results are then not analytically acceptable. About one-week old solutions of potassium ferricyanide gives much better results than fresh ones. The reason for this is not clear.

As is apparent from the results shown in Table I, salicylamide can be determined within the range from 10.00ng to 400ng with a maximum error of 7.6%. Paracetamol up to 4 folds of salicylamide amount does not interfere with the determination, while caffeine even beyond 20-fold of salicylamide amount has no interfering effect on its determination (Table II). The determination of salicylamide in the presence of paracetamol and caffeine in synthetic mixture (Table III a) and the application of the standardized method to the determination of salicylamide in the commercially available "Malidens tablets" (Tabel III b) clearly indicates the soundness, accuracy and sensitivity of the method for its use in routine analysis.

References

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