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A SIMPLE METHOD FOR DETERMINATION OF CAFFEINE CONTENT IN TEA SAMPLES

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ABSTRACT: *The present communication describes a simple and modified colorimetric procedure for the estimation of caffeine content in both commercial and locally available tea samples. Comparative data of caffeine content in different brands of tea samples are shown here. The present method is no doubt an improvised procedure for estimating directly caffeine content from the tea extracts. A possible explanation to account for the variability in caffeine content in different samples is offered.*

INTRODUCTION

Caffeine (1,3,7 – trimethyl Xanthin- 2,6-dihydroxy purine) constitutes one of the crucial groups of plant alkaloids. It is present in considerable amounts in substances such as cocoa, kola nuts and leaves of tea and coffee plants. Caffeine finds its use in pharmaceutical industry as caffeine sodium benzoate and caffeine citrate[1]. It is cardinal stimulant of CNS system with specific action on blood vessls[2]. A retrospective survey of documented literature shows a close linkage between caffeine content and different pathological conditions[3].

Number of reports are available for the estimation of caffeine in both official and published research papers[4-6]. But there is a lack of simple inexpressive method for direct estimation of caffeine from tea leaves. Therefore, it was felt worthwhile and desirable to undertake the present work on caffeine estimation using preparative TLC-Colorimetry based method to provide useful information.

MATERIALS AND METHODS

The data for the present work comprises all in all 12 samples out of which six samples are drawn from different brands of tea available in India and other six locally available tea products in Nilgiris.

3gm of (40#) tea powder was subjected to extraction with chloroform (4x15ml) by gentle warming in water bath. The combined chloroform extract was concentrated to 2ml volume and was applied on a chromatographic plate. Standard Caffeine was also spotted as reference sample. The preparative TLC was carried out by using silical gel G as stationary phase and chloroform; acetone (9:1) as a mobile phase. The visualization of the caffeine band is confined to iodine chamber and has a Rf value of 0.55. This distinct band was

eluted and extracted with chloroform (3x15ml) and filtered through whatman no.1. The combined volume of chloroform was evaporated to dryness and resulting crystals of caffeine was dissolved in 25 ml distilled water. To this solution, 4 ml of 10% w/v solution of phosphor molybdic acid in water was added and boiled for few minutes. The solution was allowed to cool to 0^0C. The precipitate thus obtained was again filtered through G4 sintered glass funnel and the residue was washed with dilute hydrochloric acid. Yellow colour residue thus obtained from above filtration process was redissolved in acetone and the final volume was adjusted to 25 ml. Absorption was measured at 440 nm using Sytstronic photometer with acetone as blank. The amount of caffeine concentration in different tea samples under study were computed with the help of standard graph. The standard curve for caffeine has been plotted using caffeine solution 1mg to 5mg concentration, treated similarly as described above and the measurement was done at 440 nm[7].

Pure caffeine sample was procured from Loba Chem, Bombay and it was subjected to recrystallization prior to use. All other reagent used in present study was of analytical grade.

RESULTS AND DISCUSSION

The results of caffeine estimation in different brands of tea samples are set out in Table No. I. A glance at this table indicates the presence of wide variation in caffeine content between different sets of tea samples studied. Since variability of caffeine content depends on factors such as variety of tea, location, time of plucking, age of leaves, the particles size and other agro-climatic conditions of tea plantation, [3-6] it is therefore reasonable to pressure that the above factors might account for the observed variation in the caffeine content in different groups of tea samples during the present study. These values do no deviate much from the earlier reported trend of values by other workers.

TABLE – 1 VALUES OF CAFFEINE IN TEA SAMPLES

Sl. No.	Samples	Absorbance at 440nm	Caffeine content mg/3gm	Percentage of caffeine
I	**Commercial Tea Brands**			
	1. Taj Mahal	0.861	42.5	1.40
	2. Red Label	0.786	30.0	2.00
	3. AVT	0.810	32.5	1.08
	4. Diabetea	0.663	10.0	0.33
	5. 3 Roses	0.845	40.0	1.33
	6. Lipton Tiger	0.832	37.5	1.25

II	**Nilgiri Tea Brands**			
	1. Coonoor Tea	0.655	10.0	0.33
	2. Kothagiri Tea	0.652	10.0	0.33
	3. Gudalur Tea	0.620	02.5	0.08
	4. Manikal Tea	0.670	12.5	0.40
	5. Chamaraj Tea	0.692	15.0	0.50
	6. Avalanche Tea	0.630	05.0	0.16

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