CHAPTER-III

PART-I-FABRIC TESTING

PART-II-ANTIMICROBIAL STUDY

CHAPTER - III

PART : FABRIC TESTING

Fluorescent brightening agents are now an established feature of detergent, textile, paper and allied industries. Most chemists and technologists know of their uses and abuses. The general public have come to expect their white textiles to whiter and brighter than ever before. For the production of fluorescent brightening agents depend on the UV component of normal daylight, whose spectral energy quickly falls from 400 nm in the direction of shorter wavelength to 350 nm. To produce a strong violet to blue fluorescent light (about 430 nm) a fluorescent brightening agent must therefore have the following characteristics :

1) It must possess a high UV absorption capacity above 350 nm, and as near as possible to 400 nm.

2) The absorption band should fall steeply to the visible.

3) The absorbed energy should, as far as possible, be transformed quantitatively into fluorescent light. (quantum yield close to 1).

The Application of Fluorescent Brightening Agents :

The application of colourless fluorescent dyestuffs as optical brightening agents is based on practical coloristic principles.

The effect of fluorescent brightening agent depends to a large extent on its affinity and on the molecular orientation in the substrate to be brightened.

With increasing concentration of fluorescent brightening agents, the fluorescent increases approximately linearly with the logarithm of the amount of brightening agent taken up by the substrate (Weber-Fechner Law) until a saturation limit is attained; the white cannot then be further increased. The position of the saturation limit depends -

(a) On the nature of the fluorescent brightening agent(relative to composition, quantum yield, fine division or solubility).

(b) On the nature of the substrate and

(c) in the fluorescent brightening of textiles on the dyeing process (relative to temperature, pH value concentration of the liquor).[86]

where the optimum concentration typical of the saturation limit is exceeded, the achieved white may be reduced,[87] which may possible lead to a total extinction of the fluorescence, self extinction or concentration extinction.

For the application of the usual types of dilute formulations, determination of the fluorescent brightener concentration is important Since the titrimetric methods used in chemistry are not always possible,[88] optical methods of determining the concentration are often given preference.

A simple, though inexact method which is often used is the visual comparison of the fluorescence strength of the solution of a fluorescent brightening agent under a dark field UV lamp with a known concentration series of the optical brightener to be measured. The evaluation is faciliated and the accuracy improved by spotting the solutions to be compared onto paper and then assessing their fluorescence strength visually under the lamp. Although the fluorescent strength of solutions of fluorescent brightening agents can also be measured with a spectrophotometer, this method has little practical importance because of the poorer consistency of the measured values.

For Cotton Fabric :[89]

In order to achieve good results on cotton, pretreatment of the brightening material is necessary, which is carried out by boiling and chemical bleaching. The highest degree of brightness is achieved by a combination of boiling in an alkaline bath at elevated pressure and hypochlorite or peroxide bleaching. For white material boiling under pressure is suitable than boiling at atmospheric pressure.

When cotton is brightened, the fluorescent brightener may be added to the peroxide bleaching bath or to neutral exhaustion bath. Tinopal 4 BM has proved to be one of the best brightening agent for peroxide baths.

In the exhaustion process the brightening agents is added in about 0.2 gm to 4 gm per litre of bath water is used.

Fluorescent brightening agent used for brightening of textile materials, even during printing the light fastness properties of

fluorescent brightening agents of CC/DAS used for cellulosic materials are medium in daylight and xenotest. Other fastness properties are good to water and washing at 40°C, medium to good for washing at 95°C and to heat treatment upto 150°C. Medium to heat treatment at above 150°C and sanforming.

FABRIC TESTING PRESENT INVESTIGATION :

The present fluorescent brightening agents of class CC/DAS are used for cellulosic fibre are studied as below. Experimental work was done in 'Department of Chemistry' Dattajirao Kadam Textile Institute, Ichalkaranji.

EXPERIMENTAL :

Gray, unbleached cotton fabric was taken on the basis of fabric weight (owf) and bleaching was carried out in following three steps:

Process of bleaching :

1) Desizing : 145 gms of gray cotton fabric was desized using enzyme (Zymage) of concentration (15 gm/lit), sodium chloride (15 gm/lit) at 55 to 60°C for two hours. Then washed the fabric with hot water (temp. 85°C) and rinsed it with water. Removal of peptine takes place.

2) Scouring : Desized fabric was boiled with NaOH 3.7% owf (on the basis of fabric weight), 1% sodium silicate, 1.5% anionic detergent [Lissopal D.]. Boiled the material for two hours keeping material to liquor ratio 1:20 [1 gm : 20 ccs. of water].

3) Bleaching :

(a) Hypochlorite bleaching : Treated the fabric with hypochlorite like sodium hypochlorite or calcium hypochlorite [7.5 gms.] at room temperature for two hours. Washed it thoroughly with cold water.

(b) Peroxide bleaching : H_2O_2 is used for permanent whiteness. Treated the material with peroxide 3.6% owf [30% H_2O_2] sodium silicate [1.5%], sodium carbonate [1.5%] at 85°C for two hours washed with hot and cold water and dried. Perfectly white sample we get. It was used for treatment of fluorescent brightening agents.

Bleached fabric material was cut into small pieces. Solutions of fluoresdcent brighteners of different concentrations were prepared by dissolving weighed sample in distilled water. Solutions of standard fluorescent brighteners were made at the same time. To make comparison between brightness increase of fluorescent brighteners synthesised and standard, 0.02% to 0.4% concentrations of fluorescent brighteners are used. Liquor ratio was 1:6.

Fabric pieces were dipped in the solutions of fluorescent brighteners for five minutes each. Padding was done for uniform distri bution of the brightener on fabric. Fabric was dried to 60°C. Whiteness or brighteness of fabric was observed by visual methods.

Results and discussion were reported.

Books Referred : Handbook of Textile Testing.

TABLE OF RESULTS

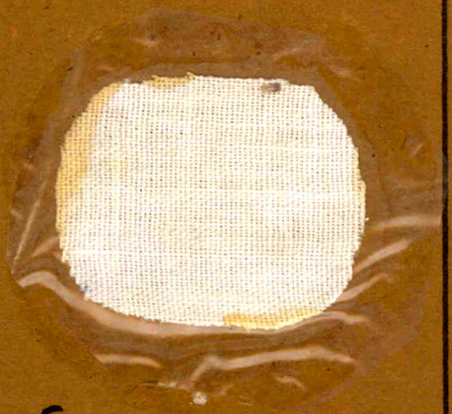
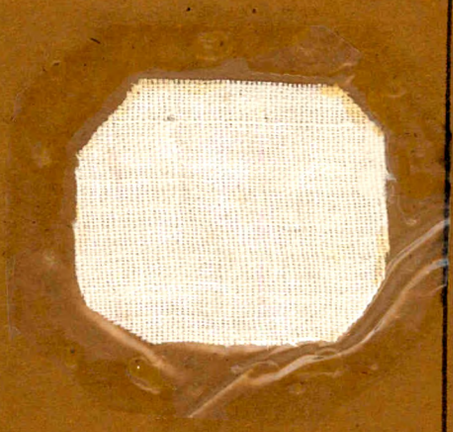
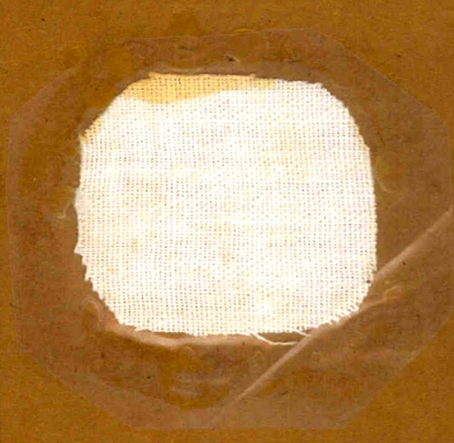
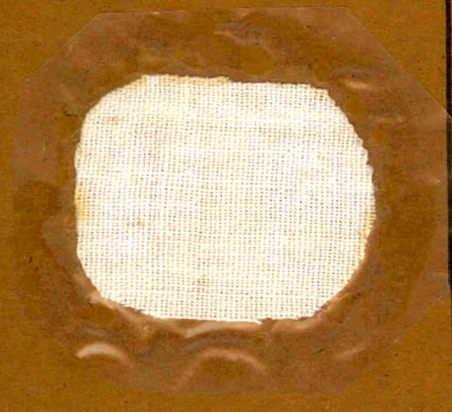
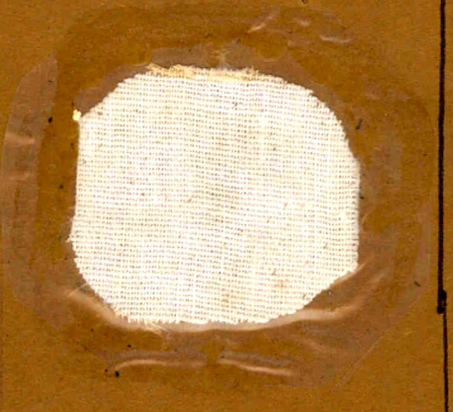
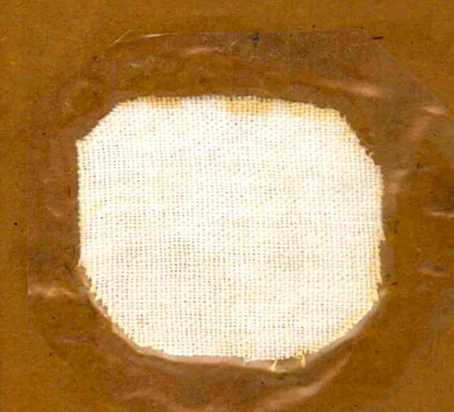
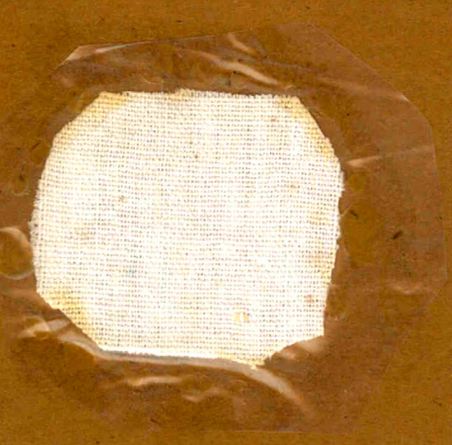
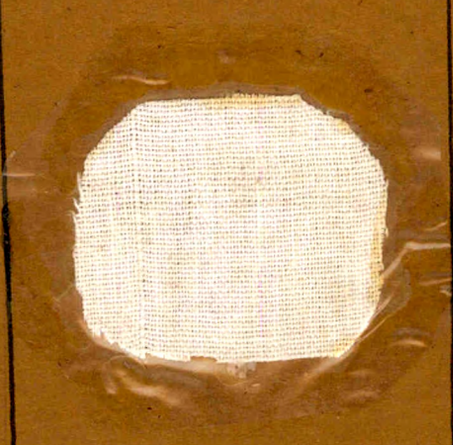
FBA No.	NAME OF COMPOUND	CONCENTRATIONS IN PERCENTAGE							
		0.02%	0.06%	0.1%	1.5%	2%	2.5%	3%	4%
1.	4,4'-Bis[6-Metanilo-4-diethanolamino-1,3,5-Triazin-2-yl] amino stilbene-2,2'-disulphonic acid.	+++	+++	++	+	-	-	-	-
2.	4,4'Bis[6-(6-Aminouracilo)-4-diethanol-amino-1,3,5-Triazin-2-yl] aminostilbene -2,2'-disulphonic acid	++	++	+	+	-	-	-	-
3.	4,4'-Bis-[6-Benzhydrazido-4-diethanol-amino-1,3,5-Triazin-2-yl] aminostilbene 2,2'-disulphonic acid	++	+	+	+	-	-	-	-
4.	4,4'-Bis-[Benzoylo]aminostilbene -2,2'-disulphonic acid	+++	+++	++	+	+	-	-	--
5.	STANDARD - Photine HVN	+++	+++	+++	++	+	+	-	-
6.	STANDARD - Photine C	+++	+++	+++	++	+	-	-	-

+++ : Very good whiteness ++ : Good whiteness + : Medium whiteness

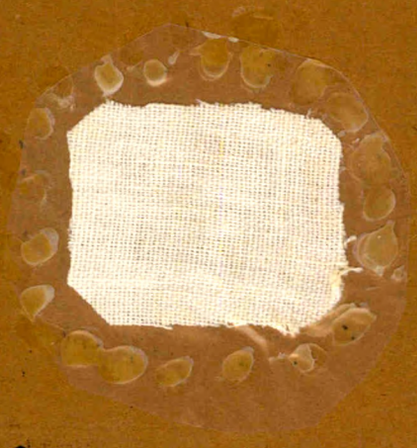
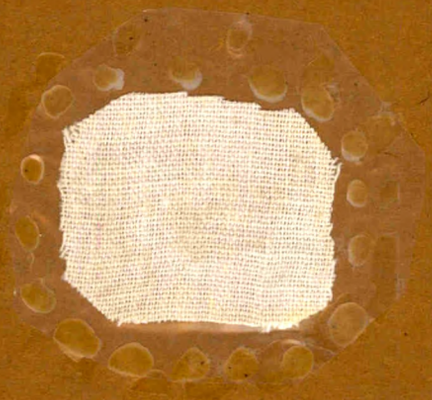
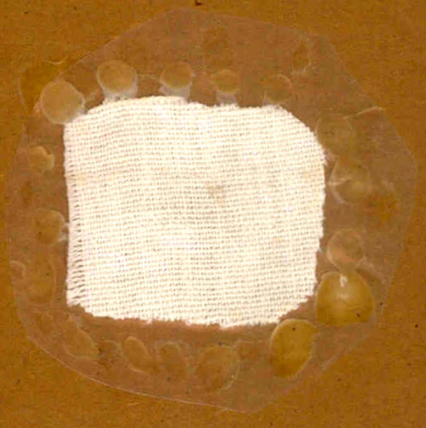
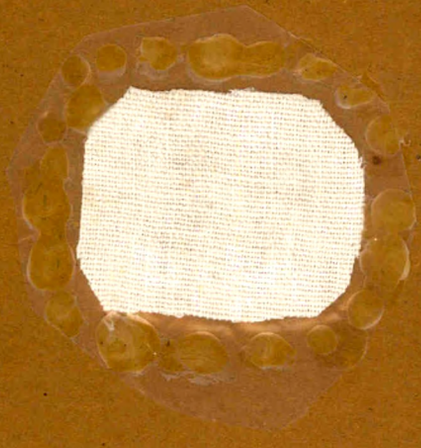
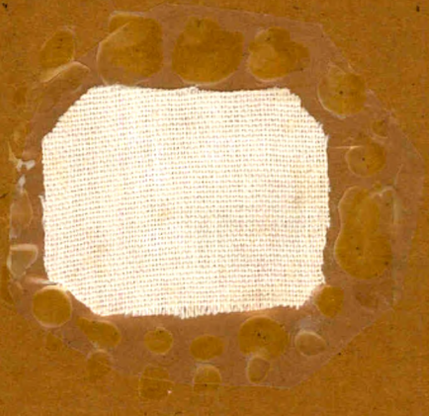
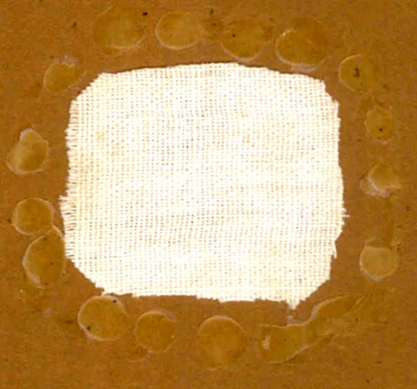
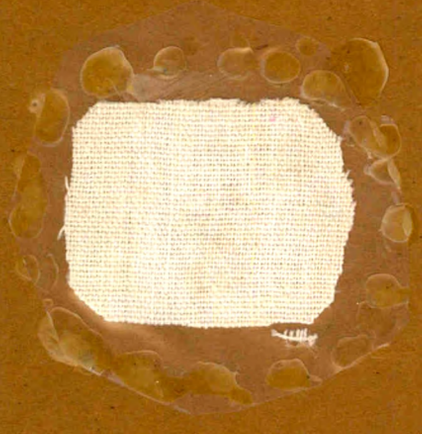
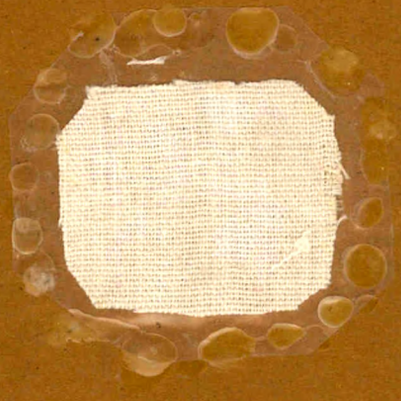
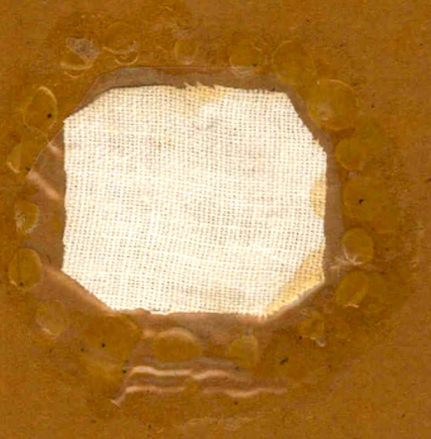
\- : No whiteness - : Yellowness

By observing above table the brightness or whiteness property of the fluorescent brightener decreases by increasing concentration above 1.5%.

FABRIC TESTED WITH DIFFERENT F.B.A.

STANDARD F.B.A.	F.B.A. No. 1	F.B.A. No. 2
 Concentration 0.02 %	 0.02%	 0.02%
 0.06%	 0.06%	 0.06%
 2%	 2%	 2%

FABRIC TESTED WITH DIFFERENT F.B.A.

STANDARD F.B.A.	F.B.A. NO. 3	F.B.A. NO. 4
 Concentration 0.02 %	 0.02 %	 0.02 %
 0.1 %	 0.1 %	 0.1 %
 2.5 %	 2.5 %	 2.5 %

PART - II

ANTIMICROBIAL STUDY OF FLUORESCENT BRIGHTENING AGENT :

INTRODUCTION :

Many amines show a remarkable antiplasmodial action. When aromatic heterocyclic nucleus[90] is attached to amino group, the antiplasmodial action is increased.

There are some heterocyclic compound like cyanuric chloride and the compound 4,4'-diaminostilbene 2,2'-disulphonic acid which had exhibited an antibacterial activity when they are as a fluorescent brighteners. Thus CC/DAS group is responsible for drug activity.

PRESENT WORK :

The present fluorescent brightening agents in which cyanuric chloride is attached to different substituted amines, report the antimicrobial studies against some representative micro-organisms, as these derivatives contain heterocyclic nucleus and amino groups.

EXPERIMENTAL :

All the chemicals and solvents used were of Analar or equivalent grade.

Preparation of Reagents and Stock Solutions :

Stilbene derivatives were prepared as described in (Chapter II).

Fresh solution of all compounds were prepared by dissolving 2 mg. in 1 ml. of distilled water (for low concentration) and 5 mg in 1 ml of distilled water (for high concentration). Filter paper discs (12 mm large and 5 mm small of Whatmann filter paper No.1) were the soaked in these solutions. It was observed that 40 milter paper discs could be soaked in 1 ml of solution. Each disc corresponds to concentration /gm of the compound.

Micro-organism :

The micro-organism used for the present studies were pure culture obtained from "Department of Microbiology", Willingdon College Sangli.

The following strains were selected for antimicrobial investigation.

(i) Gran positive - Staphyllcoccusoreus

(ii) Gram negative - Klebesienapneumoniae.

Assay Method :

The disc assay "Method in the present study was same as described by Kulkarni P.L. et.al.[92] The details of which are given below:

Nutrient agar was used as a test medium, which was prepared by dissolving 'difco' agar, agar powder (2.5 gm), pepton (1 gm), sodium chloride (0.5 gm) in hot distilled water (100 ml). The solution (pH = 7.4) was sterlized by steam at 12 lb. pressure and 120°C for half an hour and then poured in sterlized petridishes. For fungal strain subouraud's agar containing dextrose (4%) was employed.

Test tube culture for microorganism was shaken with 5 ml of plain broth and was inoculated on agar plate by pouring the solution on surface. After about 15 minutes filter paper discs containing the test compounds were placed on the agar surface. Filter paper dipped in water was placed at the centre as control. Petridishes were then incubated with inverted position at 37°C for 24 hours and inhibition zones were measured in milimeters [for fungal strain incubation 48 hours was carried out at R.T.]. All the experiments were carried out in duplicate and average values of inhibition diagram were noted. All the operations were carried incompleted septic conditions to prevent atmospheric contamination. After completion some photographs were taken for high and low concentration as well as of large and small discs.

RESULTS AND DISCUSSION :

All the fluorescent brightening agents were tested for their antimicrobial activity against gram positive Staphyllococcus oreus and gram negative Klebesiena pneamonide bacteria but they were found to be inactive against these bacteria.

Text book of Microbiology by R.Anantnarayan and Jayram Panikar
Orient Longman, 2nd Edn.