

## Modification of the IJIRA process of stabilized bleaching of jute fabrics

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### INTRODUCTION

FOR obtaining improved light resistance and removing surface hairiness of jute fabrics after bleaching, FRL<sup>1</sup> and IJIRA<sup>2</sup> have patented two different processes. The IJIRA process of bleaching comprises of three major steps viz. (1) Chlorination (2) Extraction of the chlorinated product (3) Bleaching. In the first step, treatment was carried out with hypochlorite solution acidified with — 4% solution of HCL. But this sometimes resulted in violent evolution of chlorine gas which is both hazardous and uneconomical. Addition of 0.1% ammonium oxalate to the calcium hypochlorite

TABLE I — EFFECT OF CONCENTRATIONS OF AMMONIUM OXALATE ON pH OF HYPOCHLORITE SOLUTION

% of ammonium oxalate (o.w.f.)	pH
0.05	9.6
0.1	7.75
0.2	9.9
0.4	9.8
0.5	6.9
0.6	9.7
0.8	7.9
1.0	6.4
2.0	6.2
3.0	6.0
4.0	5.8
5.0	5.0
6.0	3.2
7.0	4.1
8.0	8.1
9.0	7.8
10.0	7.6

solution liberates chlorine gas in a very steady way. Also, there is the least chance of a chlorine hazard. The process is also economical.

### RESULTS

To obtain optimum conditions for the treatment, several experiments were performed by using

different concentrations of ammonium oxalate with calcium hypochlorite. The results are given in the Tables I, II and III. Experiments were also conducted using other salts viz., Ammonium ferric sulfate, Ammonium sulfate, Sodium oxalate, and oxalic acid (Table IV).

TABLE II — EFFECTS OF DIFFERENT CONCENTRATION OF AMMONIUM OXALATE AND THE TIME OF TREATMENT ON THE pH VALUE OF HYPOCHLORITE SOLUTION

No. of ends (runs)	pH value			
	1 %	0.5 %	0.1 %	0.05%
0	6.4	6.9	7.75	9.6
4 (10 mins.)	6.35	6.55	6.75	7.9
8 (20 mins.)	5.55	6.30	6.30	6.7
12 (30 mins.)	4.95	6.00	6.10	6.3
16 (40 mins.)	—	5.6	5.65	6.1

TABLE III — EFFECTS OF CONCENTRATIONS OF AMMONIUM OXALATE ON THE PROPERTIES OF FABRIC

Concentration of ammonium oxalate	Chlorination (av. pH)	Strength (warp)	Loss (weft)	Width shrinkage	B.I.	L.F.
1%	5.81	8.1	33.5	13.2%	50	1-2
0.5%	6.27	13.9	46.1	9.39%	46	1-2
0.1%	6.51	8.7	35.3	10.48%	50	2-3
0.05%	7.20	18.3	37.8	12.7%	52	1-2

TABLE IV — EFFECT OF OTHER SALTS ON THE pH VALUES AND LIGHT FASTNESS

	Ammonium ferric sulfate	Ammonium sulfate	Sodium oxalate	Oxalic acid
Initial pH	5.7	9.5	9.5	5.1
Final pH (after treatment for 40 mins.)	3.3	4.1	4.9	1.6
Light fastness	1-2	1-2	1-2	1-2

From the tables, it is clear that 0.1% ammonium oxalate gave the optimum results. Lot to lot variation in the overall quality and degree of bleach was also minimum in this case. The hairiness of the fabrics was also considerably reduced.

#### EXPERIMENTAL

General — For light fastness measurements the samples were exposed to light in a carbon arc Fade-O-Meter (FLA-R, Atlas Electrical Devices Company) at a temperature range  $1456 \pm 5F$ . The brightness index (B.I.) of the fabrics was measured on a photovolt Reflection Meter (Model 610, Photovolt Corporation, New York). Strength of the fabrics was measured by Ravelled and strip method (10 x 20 cm.) (Goodbrand & Co. Ltd., Stavbridge). Estimation of available chlorine was carried out by titration with sodium thiosulfate solution (1/ION) using starch as indicator.

The quality of fabric chosen for the experiments was Hessian 11 x 12-45" — 11 Oz. 50g. of the fabrics

were dipped in the mixture of calcium hypochlorite solution (6% available chlorine o.w.f.) and ammonium oxalate for 40 mins. with occasional stirring. The fabrics were then taken out and thoroughly washed under tap-water. Anti-chlorination was done with 5.0% NaOH (o.w.f.) for 5 mins. The fabrics were then washed and bleached with a mixture of CaO (6% o.w.f.) and calcium hypochlorite solution (6% available chlorine o.w.f.) for 40 mins. The fabrics were then washed thoroughly with water and finally treated with 5% HCl (5% o.w.f.) for 5 mins. and washed to remove any traces of acid. They were dried in air. In all the above mentioned treatments, the fabric to liquor ratio was maintained at 1:10.

#### ADVANTAGES

1. The process is non hazardous for the working personnels.
2. The process is economical.
3. The product obtained is very smooth and has very little hairiness compared to conventionally bleached fabrics.

4. Light fastness is either normal or better than conventionally bleached fabrics.

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#### REFERENCES

1. Reeves Brothers, Inc. U.S.P. 3,384,444 (1964).
2. FRL Process of bleaching jute U.S.P. 3,472,609 (1968).
3. IJIRA Process of Bleaching Indian Patent No. 110,628 (1967), B.P. 1,221,527 (1968). ●