THROUGH AND THROUGH DYEING OF WET CHROME LEATHERS

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Chrome tanned leathers treated with alginate and retanned with chrome can be dyed through and through. These leathers can be dried and subjected to other mechanical operations for making suede type of leathers.

Introduction

Chrome leathers are dyed in different ways depending upon the final characteristics desired in the leathers. Leathers like upper are dyed with anionic dyes in the wet state, i.e., prior to fatliquoring and crusting as these leathers are only surface dyed, while suede types of leathers are dyed with anionic dyes after crusting and rewetting.

Wet, non-crusted leather is cationic whereas crusted leather is much less cationic. As a result, anionic dyes fix mostly on the surface of non-crusted wet leather, but penetrate more in the case of rewetted crust. Hence dyeing of chrome tanned leather prior to crusting is generally not practised in making suede type of leathers wherein through and through penetration of dye/s is essential. Wet dyeing is resorted to only in dyeing of leathers like upper wherein surface dyeing is sufficient.

Generally when freshly tanned wet leathers were dyed, the dye does not penetrate in sufficient intensity. If this is made possible, it is felt that a suede could be produced by dyeing such stock and top-buffing the same. This should be possible if the affinity of chrome tanned leathers throughout the cut section of the leather is decreased by the incorporation of suitable dye-levelling agent into the leather. It was reported earlier[1] that treatment of chrome leather with alginates by the sandwich technique confers the benefit of better penetration of dye into the leather. Hence chrome leather containing sandwiched alginates was prepared and dyed with that quantity of dye which is normally used in dyeing of crusted leather, and the dyed characteristics of this leather were compared with those of (a) wet chrome leather tanned with the same quantity of chromium without treatment with the alginate or other dye-levelling agent (i.e., control), (b) wet chrome leather tanned with the same quantity of chromium but treated with Tamol NNO (BASF India Ltd), a commercial dye-levelling agent and (c) rewetted crusted chrome leather tanned with the same quantity of chromium but not treated with any dye-levelling agent.

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Experimental

1. Preparation of chrome tanned leathers

Pickled cowhide was tanned with 1.5% Cr_2O_3 (on fleshed weight) equivalent of basic chromium sulphate powder in the usual manner. Pickled cow hide was drummed with chrome extract powder for one hour, after which period the drum was flooded with 100% water (on fleshed weight) drummed for 1 hour and then basified to pH 3.8 with sodium bicarbonate. The hide was shaved to 2.2 m.m. thickness, cut into sides and the bend portion of each side was cut into 4 pieces of equal weight.

2. Preparation of alginate-sandwiched chrome-leathers

Two pieces were neutralised to pH 7.5 with ammonia and treated with 2% alginate on fleshed weight in a drum according to the procedure already described. The hide pieces were drummed for 5 hours, horsed and piled overnight. Next day, they were washed for 10 minutes in the drum in 100% float. The drum was drained and the hide pieces were retanned dry in drum with 1.5% Cr_2O_3 equivalent basic chromium sulphate powder for one hour, flooded with 100% water and drummed. The pH of the cut section of the leather thus produced was 3.8. The retanned pieces were piled overnight, dyed and fatliquored.

3. Retanning of the remaining hide pieces, (i.e., hide pieces containing no alginate) :

The shaved hide pieces (6 Nos.) were washed for 10 minutes and retanned with 1.5% Cr_2O_3 equivalent of basic chromium sulphate extract powder. The pieces were drummed for one hour with the powder, flooded with 100% water and redrummed for 1 hour. The pH of this retanning bath was slowly raised to 3.8 with sodium bicarbonate for the purpose of basifying and the pieces were piled overnight. Next day, they were divided into three lots of two pieces.

1st lot was used for making conventional wet-dyed and fatliquored 'control' leathers.

2nd lot was used for making wet-dyed and fatliquored leather after treating with Tamol NNO, to achieve level dyeing.

3rd lot was fatliquored and crusted for making dyed suedes.

4. Treating the wet leather with Tamol NNO to achieve level dyeing :

The lot was treated with 1% Tamol NNO in 100% float for 1 hour after which period the pieces were neutralised to the required pH for carrying out wet-dyeing.

5. Crusting of wet-retanned pieces for making dyed suedes :

The retanned lot was neutralised completely in a drum to pH 5.5 with sodium bicarbonate and fatliquored with 6% Lipoderm II (BASF India—on shaved weight). The temperature of the fatliquoring bath was 60°C and the float while fatliquoring was 100%. The fatliquor was finally fixed with 1% formic acid and the lot was piled overnight. Next day the lot was set, dried, sammed, staked, buffed for suede and stored as crust.

6. Processing of wet lots variously treated into dyed suedes :

The lots were separately neutralised to pH 5.5 in drum with sodium bicarbonate in the usual manner. They were further neutralised completely to pH 7.0-7.5 by the addition of ½-1% ammonia to the neutralising bath. The leather pieces thus neutralised were dyed and fatliquored simultaneously. The pH of dyeing and fatliquoring bath was raised to 7.5 by the addition of ammonia. The dye used was Derma

Brown G (Sandoz, India) and the quantity of dye used was kept the same for all experiments. Fatliquor used was 6% of shaved weight. During dyeing and fatliquoring the temperature was maintained at 60°C and the float was 100% on shaved weight. After 1 hour of dyeing and fatliquoring the bath was slowly exhausted with formic acid (¾ of the quantity of dye used). The leather pieces thus dyed and fatliquored were piled overnight. Next day they were set, dried, sammed, staked and buffed on the flesh side.

7. *Dyeing of crust leather :*

Crusted pieces were wetted back by drumming in 1000% float containing ½% ammonia and 1% Noigen LP, (Dai Ichi Karkaria Ltd.) a nonionic emulsifier for 1 hour at 40°C and then leaving in the drum overnight. Next day the drum was drained and the leather pieces were dyed at 60°C with 7% of Derma Brown G. The float during dyeing was the same as in the previous experiment i.e., 100% of shaved weight and the dye bath was adjusted to 7.5 pH by the addition of ammonia. After dyeing for 1 hour the dye bath was slowly exhausted with formic acid as in the previous experiment. The dyed leathers were piled overnight. Next day they were dried, sawdusted, staked and toggle-dried.

8. *Assessment of leathers produced :*

The dyed suedes made from crust were compared to suedes produced by wet-dyeing technique from (a) 'alginate sandwiched'-chrome leather, (b) Tamol NNO-treated chrome leather, and (c) control.

The extent of dye penetration was visually assessed at the cut section of the thickest portion.

The difference in the shade between the control and other leathers was assessed by Grey Scale.[2]

Results

Results given in Table I show that the shades of wet-dyed alginate-treated or Tamol NNO-treated leathers were less intense as compared to that of similarly dyed control. The shade of dyed-crusted leather was more intense. As regards dye penetration it was observed that the crusted

TABLE I

Characteristics of dyed leathers

Leather	*Difference in shades between control and leather variously dyed in Grey Scale Units*	*Extent of dye penetration*
Alginate-treated leather dyed with Derma Brown G	−3	almost complete
Tamol-treated leather dyed with Derma Brown G	−2	to ⅓ of thickness
Conventional crust leather dyed with Derma Brown G	+3	almost complete
Alginate-treated leather dyed with Irgalan Brown	−1	to ¾ of the thickness

− Sign indicates the decrease in intensity of shade.
+ Sign indicates the increase in intensity of shade.

leather and alginate-treated leather had better dye penetration (almost complete dye penetration) while control or Tamol NNO-treated leathers had minimal penetration (the dye had penetrated only to the extent of about $\frac{1}{3}$ thickness).

The results indicated that Tamol NNO brought about level-dyeing effect only on the surface of the leather whereas sandwiching with alginate causes decreased dye affinity throughout the skin structure and facilitated better penetration of the dye. The higher intensity of shade of crusted leather as compared to that of control is difficult to explain. The crusted leather is less cationic and hence there should be less fixation of dye on the surface as compared to the case of control.

Premetallised dyes do not penetrate leather well, particularly when leather is not crusted; hence the dye affinity of alginate-sandwiched chrome tanned goat skin prepared by the procedure adopted in making alginate-treated chrome tanned cow hide pieces was also compared to that of similarly chrome tanned goat skin containing no alginate. The wet-chrome tanned skins were dyed with Irgalan Brown (Suhrid Geigy Ltd) (3.5% on shaved weight). The fatliquoring was done as in experiment 6. The dyed leathers were set, dried, staked and buffed into suedes. The shade of wet-dyed suede of alginate-sandwiched skin is lighter as compared to that of control (Table 1). The dye penetration was to about $\frac{3}{4}$ of the skin thickness whereas in the case of control the dye did not penetrate. It remained only on the surface. The nap of alginate-treated wet-dyed leather was even better than the nap of crusted leather.

These results would show that the production of wet-dyed suede is possible if alginate is sandwiched during the process of chrome tanning.

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