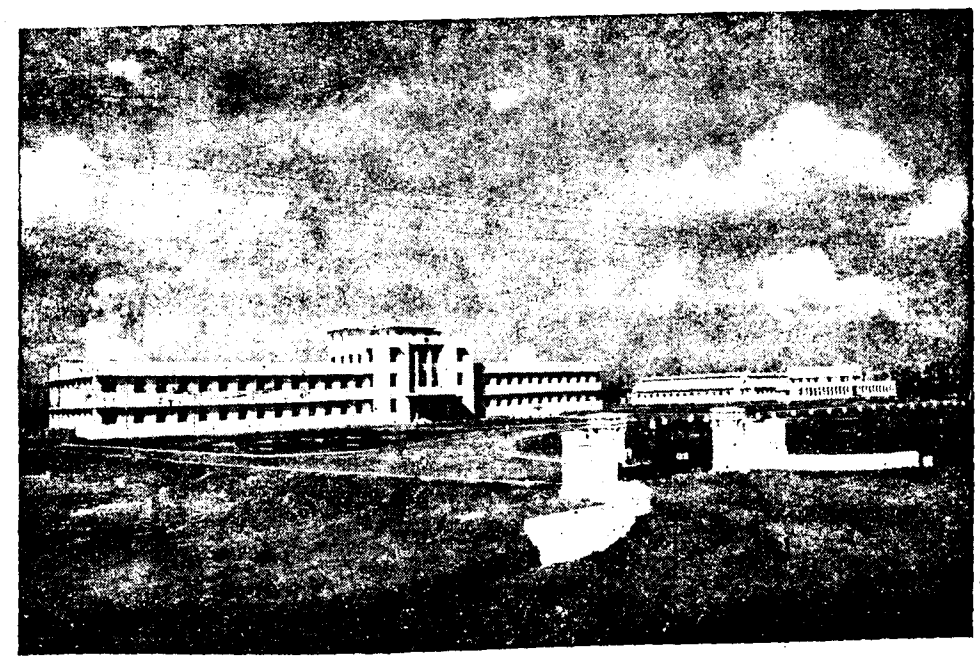
# Bulletin of The Central Learner Research Institute Madras



VOL. IV MARCH, 1958 No. 3





COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
INDIA

# Bulletin of
# The Central Leather Research Institute

Vol. IV March, 1958 No. 8

CONTENTS







Annual Subscription.—Rs. 9/- (inland); Rs. 18/- (foreign); Single Copy 75 nP.

The Bulletin of the Central Leather Research Institute is issued monthly.

Communications regarding contributions for publication in the Bulletin, books for review, subscriptions and advertisements should be made to the Secretary of the Editorial Board, C. L. R. I., Madras-20.

All remittances by cheque or money order should be made payable to the Director, Central Leather Research Institute.

DR. Y. NAYUDAMMA

## APPOINTMENT OF DR. Y. NAYUDAMMA AS DIRECTOR

*Central Leather Research Institute*

We have great pleasure in announcing the appointment of Dr. Y. Nayudamma, Assistant Director-in-charge, as Director, Central Leather Research Institute, Madras, with effect from 13th February, 1958.

Yelavarthy Nayudamma was born on 10th September, 1922, in the present state of Andhra Pradesh. After graduating in Industrial Chemistry from the Banaras Hindu University, he had advanced training in Leather Technology in U.K. and U.S.A. While at U.S.A., he obtained his Doctorate and was associated with late Dr. E. R. Theis and a group of American Tanners. His visits to U.K. and U.S.A., gained for him valuable practical experience in the manufacture of various types of leathers.

After his return to India, Dr. Nayudamma entered service in the Central Leather Research Institute, where he has been actively associated with the planning, design, construction and putting into commission of the various laboratories, the model Tannery and the Pilot Plants and has been conducting and guiding research. He has to his credit more than 100 publications.

Dr. Nayudamma's connection with the Indian Leather Industry dates back to 1943 and it has been his firm conviction that if research is to bear fruit, the Institute should work in close liaison with the Industry at large. Consequently, the research programme of the Institute has been geared up to the immediate needs and demands of the Industry at the various levels. Due to his initiative, practical

demonstrations of the processes developed at the Institute are being staged regularly and the Open House is organised periodically in order that the Industry and the Public may get an opportunity to assess the work done here. The publications brought out, the Symposia held at the Institute, the Short Term Refresher Courses and the Extension Service Schemes, serve the purpose of disseminating technical information.

He has maintained close contacts with the Leather Industry and Leather Scientists of other countries also. He was an active participant in the Working Party Meeting of the ECAFE on Leather Industry held at this Institute in 1957 and in the Conference of the International Society of Leather Trades' Chemists held at Rome in September, 1957.

Dr. Nayudamma is the Hon. Professor of Leather Technology, Madras University and consequently a member of the University Committees connected with technological education. Under his guidance, research workers of this Institute are submitting theses for the M.Sc., and Ph.D., Degrees of the Madras University.

He is associated with the following official bodies :—

(1) Chairman, Leather Sectional Committee, Indian Standards Institution, (2) Member, Advisory Committee, Indian Standards Institution, Madras Office, (3) Member, Leather Export Promotion Council, (4) Member, Export Promotion Advisory Committee, (5) Member, Research Committee of Village Industries Research Institute, Maganwadi, (Wardha), organised by the All-India Khadi & Village Industries Commission, (6) Member, Planning and Action Research Committee, Lucknow, (7) Member, Forest Utilisation Board, Madras, (8) Hon. Special Officer, Indian Central Arecanut Committee, Kozhikode, (9) Member, Animal Diseases & Pests Committee of the Indian Council of Agricultural Research and (10) Member, Sub-Committee



for Leather Industry of State Industries Development Committee, Madras State.

He is also member of various Indian and foreign Scientific Association like Institution of Chemists (India), Sigma XI Society of America, Society of Leather Trades' Chemists, England, American Leather Chemists' Association, American Chemical Society, Indian Science Congress Association and the Association of the Principals of Technical Institutions (India).

Dr. Nayudamma is a Rotarian and Member of the Board of Directors of Sri Seva Sadan, Madras. He was named 'The Scientist' for the year 1957 by the Andhra Vidyarthi Samithi.

# A METHOD FOR EVALUATION OF ORGANIC SULPHUR IN COMMERCIAL WASTE SULPHITE LIQUOR

K. B. MATHUR & S. K. BARAT
*Central Leather Research Institute, Madras*

SUMMARY

Determination of the sulphur constituents, especially the organic sulphur, in commercial waste sulphite liquors, is of importance, in the proper utilisation of these. This involves estimation of total sulphur, sulphate sulphur, sulphite sulphur and organic sulphur. Three methods are available for estimating total sulphur; sulphite component is determined iodimetrically; for sulphate determination, a conductometric method has been tested and found suitable. The organic sulphur content can be calculated from the results.

Interest in the use of waste Lignin products, particularly the sulphite waste liquor, as a potential tanning agent has largely increased during recent years. This has been so, partly through the increased shortage of natural tanning materials and partly through the increased efforts which have been made to find a satisfactory use for this cheap and plentiful by-product. However, the available experimental information as well as the Industrial experience show that sulphite waste liquor is not a satisfactory tanning agent by itself, but that it could be successfully used as an extender for the natural tanning materials. Many previous workers[1, 2] have attempted to study the nature and the manner in which lignosulphonic acid and its salts may react with the hide protein and have concluded generally, that the fixation of lignosulphonic acids by hide occurs at the free amino group. At the same time, the work of Lipsitz and Lollar[3] has indicated with sufficient evidence that fixation of Magnesium Lignosulphonate also occurs at points other than the free amino groups and that it is this additional fixation which is responsible for the superior leather-making properties obtained with this material. Any possibilities of a



hydrogen bonding mechanism are, of course, limited because of a low phenolic hydroxyl group content of these commercially available ligninsulphonic acid and their sulphonates.

In spite of such a large number of investigations, there is still a lack of fundamental knowledge of the reaction between Ligninsulphonic acid and collagen, the protein of the hide substance. Much of this earlier work suffers from the fact that it has been carried out on the crude sulphite waste liquors about half of which consists of sugars and inorganic materials, the remainder being Ligninsulphonic acids of widely different molecular weights. Also, we know that the sulphite waste liquors vary appreciably according to the cooking conditions, species of wood, etc., and experiments based on liquors of different origin may cause considerable error. No standard method is available for evaluating the tannin content, i.e., the Lignin content in the case of sulphite liquors, similar to the official method for the vegetable tannins. Depending upon the nature of cooking, the waste sulphite liquor may contain ligninsulphonates of varying degrees of dispersion. The extent of reaction of lignin with sulphurous acid determines the particle size and molecular distribution which, in turn, may affect its sulphur content and affinity for the pelt. The preferential absorption of low and high molecular ligninsulphonic acids is dependent to a large number of factors such as time, temperature, pH and concentration, as investigated by Marshall *et al.*[4] For the above reasons, it is necessary to get purer samples of Ligninsulphonic acids and then study the reaction of various fractions of varying molecular weights of ligninsulphonic acid with collagen. A study of this type, obviously necessitates investigations for determining the sulphur constituents of the waste sulphite liquors, as they would help a great deal in interpreting results of dialysis and fractionation of Ligninsulphonic acids from the waste liquor.

Furthermore, current interest in evaporation, steam stripping, and other treatments for utilisation of sulphite

waste liquor has emphasised the need for an accurate method of determining the various types of sulphur present in the liquor. The need arises not only in actual plant process for an index of scale-forming potential, but also for research purposes to follow changes in the state of oxidation of sulphur compounds in the liquor and to compute sulphur balances for various liquor treatments.

Recent researches concerned with the tanning potential of Lignin wastes have given many additional indications that these materials, if properly modified by chemical means, would perhaps be a great source of potential replacement syntans. The chief of such modifications comprise in the minimum desulphonation of Ligninsulphonic acid to decrease its amino specificity, formation of a sulphone bridge by its condensation with phenols and other phenolic substances and the dispersion of phenolic aldehyde type polymers. In all the reactions of the type stated above, the sulphonic groups of the Lignin material play the important part. It is obvious, therefore, that the analysis of the commercial waste sulphite liquors with a view to elucidating its organic sulphur content will help solve many difficulties met with in making synthetic tanning materials from these waste lignins.

The sulphur containing compounds in common waste sulphite liquors are, as we know, the Ligninsulphonate, the excess of bisulphites, sulphites, free sulphurous acid and a little of sulphates. The sample of sulphite lye used by us, however, has a pH of 7·5 and so, there is no possibility of free sulphurous acid and bisulphite being present therein. It is evident, thus, that in case we determine the 'Total Sulphur', the 'sulphate-sulphur', and the 'sulphite sulphur' in the sulphite lye, the organic sulphur, i.e., the sulphur of the sulphonic groups in Ligninsulphonic acid may be easily calculated. Now, so far as the total sulphur and the sulphite are concerned, various methods are available for their determination, and we can select any one of them, whichever



suits our purpose better. On the contrary, the estimation of sulphate still suffers from lack of an efficient method for its determinations from sulphite waste liquors. It is rather difficult to precipitate small amounts of sulphates quantitatively from solutions appreciably contaminated with sulphonic acids. A conductometric titration method, using the conductivity curves of sulphate titration with $BaCl_2$ solution, as suggested by Peniston *et al.*[5] was tried by us in the first instance. This disclosed that the specific conditions of titration followed by them would not hold good in case of the material used by us. For, at the pH, and concentration of the waste sulphite liquor used by us there was hardly any net gain in conductivity during titration, leading to no definite result. It was, therefore, considered worth-while to investigate any possibility of modifying the method so as to work out satisfactory conditions of titration for the sample of waste lye made available to us.

## EXPERIMENTAL

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*Determination of Sulphate*:

The sample of the waste sulphite liquor subjected to this investigation was kindly supplied by M/s. India Paper Pulp Co., Ltd., Calcutta, in the form of a very thick paste (Total solids = 72% by weight) at pH 7·5. The lignin constituent of this is mainly a magnesium salt of lignosulphonic acid along with some of the calcium salt. The preliminary experiments suggested the following :

1. The commercial material should be diluted to a limited volume for the sake of convenience in the pipetting of samples to the ion exchange column. Portions of sulphite liquor ranging from 35-50 gms. when diluted to 100 c.c. in a volumetric flask were found to give a satisfactory analytical solution.

2. In order to enhance the sensitivity of the titration, increasing the concentration of alcohol in the titrant, and

the concentration of the $BaCl_2$ solution were considered with favourable results. The optimum quantity of alcohol in 340 c.c. final solution was found to be 190 c.c. and the strength of $BaCl_2$ solution to be N/2 approximately.

3. It was found unnecessary to add formaldehyde to the titrant as suggested by Peniston and his coworkers, since there was no bisulphite to be complexed.

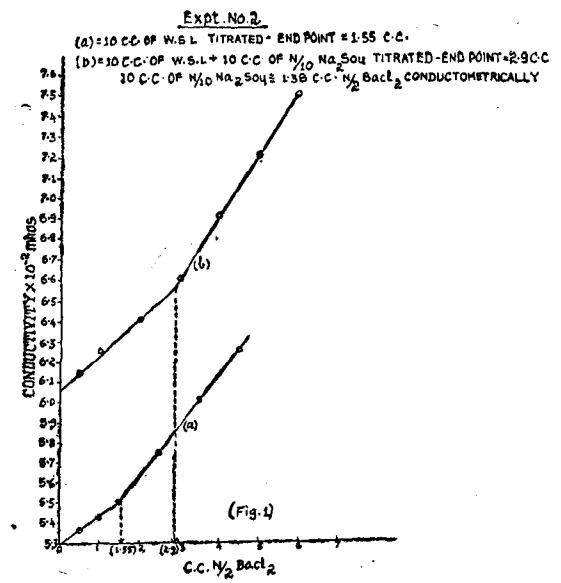
4. A Mullard Electronic Conductivity Bridge with dip type cell could be advantageously used because of the easy manipulation and quick results it affords.

*Procedure*:

First of all, a N/2 solution of AnalaR $BaCl_2$, N/10 solution of AnalaR $Na_2SO_4$ and a solution of waste sulphite liquor (taking 35-50 gms. of the original solution and made upto 100 cc.) were prepared. A resin column was made by taking a 35 cm. long pyrex tubing of 13 mm. diameter and attaching it to a 3 mm. bore siphon tube. The column was then filled up to a height of about 20 cms. with Amberlite IR-120, a powerful cation-exchange resin. This was regenerated by passage of 200 cc. of 10% NaCl solution and finally washed with distilled water, free from chloride ion. A 10 cc. sample of the waste sulphite liquor solution prepared above was delivered from a pipette to the ion-exchange column and was allowed to flow through it. When the liquid level just came to the top of the bed, 20 cc. of distilled water were added and allowed to pass through the column. This was further repeated thrice. The $Ca^{++}$ and $Mg^{++}$ ions are thus exchanged with $Na^+$. The total effluent is diluted to 150 cc. with distilled water and then 190 cc. of pure isopropyl alcohol were added to it so that the total volume of the final solution becomes 340 cc. The beaker is then mounted on the titration assembly and the solution stirred for about 3-4 minutes by means of a magnetic stirrer before the initial conductivity of the solution is recorded. It is absolutely necessary to use the freshly platinised electrodes



for every titration. $BaCl_2$ solution is then added through the burette in 0·5 cc. lots and the solution stirred for 1 minute before the conductivity is noted. There is a sudden increase in conductivity as the end point approaches and 3-4 points beyond it should be taken. The readings of conductivity are plotted on a graph paper against the volume of $BaCl_2$ added and the conductivity curves obtained by constructing two straight lines through the points. A typical set of curves is given in Fig. 1.




In various other experiments, known amounts of $Na_2SO_4$ were added to the solution after passing the latter through the ion-exchange column and the solution titrated with $BaCl_2$ in the same manner as stated above. The data obtained is given in Table I.

*Total Sulphur*:

In our search for a simple and reliable method for estimating total sulphur in waste sulphite liquors we tested several methods: (1) Wet oxidation with alkaline $KMnO_4$, (2) Fusion with pure soda according to the method of 'Berkmann and Kiprianoff'[6] recommended for determination of

TABLE I

(Determination of $SO_4$)

| Expt. No. | Wt. of W.S.L. in 100 cc. (gms.) | cc. of W.S.L. | cc. of N/2 $BaCl_2$ | cc. of N/10 $Na_2SO_4$ added | gms. $Na_2SO_4$ added | Actual sulphate present (gms.) | Calcd. amt. of sulphate (gms.) |
|---|---|---|---|---|---|---|---|
| 1 (a) | 41·4796 | — | 1·38 | 10 | — | 0·0493 | 0·0490 |
| (b) | -do- | 10 | 1·7 | — | — | — | 0·0604 |
| (c) | -do- | 10 | 3·06 | 10 | — | 0·1094 | 0·1036 |
| (d) | -do- | 10 | 2·65 | — | 0·0338 | 0·0942 | 0·0941 |
| 2. (a) | 37·9454 | 10 | 1·55 | — | — | — | 0·0550 |
| (b) | -do- | 10 | 2·9 | 10 | — | 0·1040 | 0·1030 |
| (c) | -do- | 10 | 2·15 | — | 0·0214 | 0·0764 | 0·0763 |
| (d) | -do- | 10 | 2·45 | — | 0·0328 | 0·0878 | 0·0371 |
| 3. (a) | 45·8504 | 10 | 1·875 | — | — | — | 0·0666 |
| (b) | -do- | 10 | 3·25 | 10 | — | 0·1156 | 0·1154 |
| (c) | -do- | 10 | 2·575 | — | 0·0246 | 0·0912 | 0·0914 |

total sulphur in Synthetic Tanning materials and (3) wet oxidation of the liquor with perchloric and nitric acids as adopted by Salvesen and Hogan.[7]

The first mentioned method is no doubt quick but it is troublesome because the heavy precipitate of $MnO_2$ encourages bumping in the solution so that even by using Kjeldahl flasks fitted with reflux condensers, loss cannot be avoided. The results obtained were varying and low. The second method was found to be unsatisfactory in that it required unusually longer periods for fusion and the results obtained were comparatively low. Oxidation of the liquor with perchloric and nitric acid in the wet state was found to be much easier and quicker. The results obtained were quite reproducible. The exact procedure followed for wet oxidation with perchloric and nitric acids is given below:

40 to 50 gms. of commercial waste sulphite liquor is weighed into a 100 cc. volumetric flask and the solution made to 100 cc. 10 cc. of this solution are pipetted into a 100 cc. Kjeldahl flask. Now 10 to 15 cc. of conc. Nitric acid and 5 cc. of perchloric acid are added to it. It is important to have sufficient nitric acid present in order to avoid possibilities of explosions. If the solution suddenly darkens after the main part of the excess $HNO_3$ has boiled off, the digestion should be discontinued immediately and more nitric acid added before proceeding further with the digestion. The flask is placed on a steam bath for about 15-20 minutes by which time the oxidation reaction would have subsided as indicated by absence of red brown fumes. The flask is then transferred to the digestion shelf and heated moderately over the burner until a colourless solution is obtained. The solution is allowed to cool to room temperature and again heated on the shelf after addition of 5 cc. of conc. hydrochloric acid until white perchloric acid fumes appear. It is then cooled and diluted with about 50-60 cc. of distilled water and warmed on steam bath to dissolve all the salts. The undissolved silica is filtered off and the filtrate and

washings collected in a 250 cc. volumetric flask. The solution is made upto 250 cc., shaken well, and 50 cc. of it are pipetted in a beaker for sulphate precipitation by $BaCl_2$. Results are expressed in gms. $SO_3$ per 100 gms. of sulphite liquor. Table II shows the amount of total sulphur as estimated by various methods.

TABLE II

Sulphur in Waste Sulphite Liquor

| Expt. No. | Sulphite liquor taken | Method | Wt. of $BaSO_4$ (gms.) | Gms. $SO_3$ | Gms. $SO_3$/100 gms. W.S.L. |
|---|---|---|---|---|---|
| (1) | 1·2848 gms. | $KMnO_4$ method | 0·6053 | 0·2076 | 16·16 |
| (2) | 1·6034 „ | Fusion with $Na_2CO_3$ | 0·7604 | 0·2608 | 16·28 |
| (3) | *10 cc. of W.S.L. soln. (= 4·5850 gms.). | Wet oxidation method | 0·4396 | 0·1508 | 16·44 |

* Only 50 cc. of the oxidised solution were taken for $SO_4$ precipitation out of the 250 cc.

*Estimation of Sulphite* :

The sulphite present was estimated according to the T.A.P.P.I. method, viz., the iodine method of volumetric analysis. 10 cc. of a waste sulphite liquor solution containing known amount of the commercial product is pipetted into an iodine flask, to which 25 cc. of a N/10 solution of $I_2$ (which has been previously titrated against the standard N/10 sodium thiosulphate solution electrometrically) are added. Now, 10 cc. of conc. HCl is added to the flask which is stoppered tight and the solution shaken for 5 minutes. The entire solution is then transferred to a 400 cc. beaker. The flask is washed twice or thrice with distilled water and the washings added to the main solution. The excess of



iodine present in the final solution is then quickly titrated by standard sodium thiosulphate solution using a "Serfass Electron Ray Titration Unit". The endpoint is detected by a sudden change of the image in the electronic eye from a maximum expanded position to the narrowest state permanently. Results are given in the Table III.

TABLE III

Estimation of sulphite

| Expt. No. | Wt. of the W.S.L. in 100 c.c. | cc. of W.S.L. soln. taken | cc. of $I_2$ (N/10) | cc. of thiosulphate reqd. | Gms. $SO_3$ per 100 gms. of W.S.L. |
|---|---|---|---|---|---|
| 1. (a) | 23·9456 gms | — | 25 | 23·85 | — |
| 1. (b) | -do- | 10 | 25 | 17·8 | 0·8063 |

*Discussion*:

The conductometric titration of sulphate with $BaCl_2$ has successfully overcome the objections associated with its determination in waste sulphite liquors according to the previous methods, following which the actual amounts of sulphate could not be directly precipitated as $BaSO_4$ because of protective action of the sulphonic acids. On the other hand, when lignin is precipitated out prior to the sulphate determination by hot digestion with HCl, the errors arise from oxidation of sulphites during lignin digestion besides incomplete recovery of sulphate in washing the lignin precipitate and so on. All such errors have been avoided in the present method. The passage of waste lye through the ion-exchange column removes $Ca^{++}$ and $Mg^{++}$ ions, which are substituted by $Na^{+}$ ions. The alcohol concentration in the final solution was increased with a view to enhance the sensitivity of the system in recording minor changes in con-

ductivity due to sulphate precipitation as well as to shorten the time for obtaining stable readings after every addition of $BaCl_2$ solution. The presence of extraneous amounts of electrolytes in the titrant resulted in little increase in conductivity after addition of comparatively smaller amounts of N/10 $BaCl_2$ solution. The increased concentration of $BaCl_2$ solution facilitated correct registering of changes in conductivity. With addition of known amounts of sulphate, the method shows good concordance.

The above procedure for the determination of sulphates in waste sulphite liquor holds good only when the stock solution is made up to the requisite standard by adjusting the pH and the total solids of the commercial product beforehand.

The results of total sulphur obtained by the method of perchloric and nitric oxidation were satisfactory and gave reproducible values. In the case of sulphite estimation it was necessary to use the Electron Ray Titration Assembly because the solution to be titrated was quite dark and this overshadowed the colour change with starch solution completely. To overcome this difficulty, the electronic eye was utilised where minute changes of potential difference are magnified to a very great extent, thereby causing the end point to be detected by the addition of a single drop of thiosulphate solution. The iodine solution was also standardised against thiosulphate in the same manner, so that the conditions of both the titrations were the same.

Given the figures for total sulphur, the sulphate and the sulphite, the amount of organic sulphur could be easily calculated by subtracting the sum of sulphate and sulphite sulphur from the total sulphur value. This is summarised below:

1. Total sulphur (S) = 6·583 gms./100 gms. of W.S.L.
2. Sulphate Sulphur ($s_1$) = 0·3274 gms./100 gms. of W.S.L.



3. Sulphite sulphur ($s_2$) = 0·4032 gms./100 gms. of W.S.L.
4. Organic sulphur ($s_3$) = 5·8524 gms./100 gms. of W.S.L.

Thus, knowing the percentage of organic sulphur in the waste sulphite liquor, we can account for various reactions concerned with the modification of ligninsulphonic acid where the sulphonic groups are involved.

*Acknowledgement:*

Thanks are due to the Director, Central Leather Research Institute, Madras, for permission to publish this paper.

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## RESEARCH BEARS FRUIT

### Practical Demonstration No. 9

### Manufacture of fancy leathers from chrome tanned grain leathers and splits*

A. GANESAN

Grain leathers and splits may be very attractively finished using what are known as decalomanias or transfer papers. The transfer paper has usually a design which may be in single or multi-colours, and it is totally transferred to the leather. The paper is destroyed in the course of transfer. Decalomania coated leathers can be used in hand bags and other articles where the decorative effect will be appreciated. Decalomanias are available in many designs such as flowers and foliage, scenery, Python grains, Lizard grains, and in fact in every imaginable pattern and colour combination. This is a very interesting field which may be profitably exploited by our tanners. The process that was demonstrated is furnished below.

### DETAILS OF THE PROCESS DEMONSTRATED

*I-(a) Decoration of grain leathers with Decalomania.* Raw material for this type of leather is full chrome goat or sheep skins or cow sides. Leathers of inferior quality may also be processed.

The usual method of chrome tanning may be used. After splitting and shaving to about 1·0 mm. substance, leathers are neutralised and fat liquored. Where very poor sides are processed the grain may be shaved off and the process given for splits, subsequently, may be followed.

*Process demonstrated during the month of November, '57.



Shaved leathers are weighed and loaded in a drum with a float of 200%. Drum is run for 10 minutes and the bath is drained. Another wash is given for the same duration. Neutralisation is done with 1-1¼% Sodium bicarbonate in a fresh float of 200% for about ¾ hour. The alkali for neutralisation may be preferably added in two instalments at interval of 20 minutes. After neutralisation, bath is drained and a wash is given using water at 100°F in the same way as described above. Leathers are now ready to be fat liquored.

The leathers are floated in 100% water at 65°C, 4·0% sulphated cotton seed oil (made by CLRI) is weighed out and emulsified by adding hot water at 65°C. This is poured into the drum, the drum is run for 20 minutes and then drained.

5% of China clay in the dry state is now put into the drum and the drum run for 10 minutes. The leathers are piled. Next day they are struck out, sammied, set out and dried. When completely dry, they are aged for 3 days, conditioned in the usual way, staked, nailed on boards and dried. The dried leathers are trimmed, and buffed on the flesh side with 180 emery paper and on the grain side with 320 and 400 paper. The buffed leathers are brushed and are ready for the decalomania application.

*Decalomania application :*

A white pigment finish is prepared as given below :—

| | | |
|---|---|---|
| White pigment paste | .. | 1 part |
| Acrylic Co-polymer emulsion (40% solids) | .. | 2 parts |
| Water | .. | 4 parts |

The *finish* is applied on the grain side twice by brush or pad, drying in between. In certain cases a spray coat of the resin emulsion diluted four times, over the pigment coat

is helpful. The leather is aired off after this application of finish. The decalomania paper having the design required to be transferred is put on the grain side with, of course, the design in contact with leather. The assembly of decalomania and smooth plate is heated to 190°-195°F. The press is now closed and kept in the closed state for about a minute. The most important point is to avoid air bubbles and folds. Air must be allowed to go during the lamination. Any fold or wrinkle allowed to be developed cannot be rectified easily later.

Where a hydraulic press is not available a hand iron may be used. Small sections must be ironed gradually eliminating air. Great care and skill is necessary when using hand iron. Due to the heat employed, the adhesive used on the decalomaina becomes plastic and releases the design from the paper. So it is necessary that the temperature employed be sufficiently high as to release the design. Temperature recommended will vary naturally with the type of adhesives used in making the decalomania.

When the paper becomes well fixed into the leather without any fold or wrinkle and is quite flat it can be assumed that the transfer had been well made. Now water is sprayed on the surface of paper so as to soak it. When sufficient water is sprayed, the paper automatically lifts itself up and is peeled off. Now the leather is air dried and a nitro cellulose lacquer is sprayed on the decalomania coated surface. After the lacquer spray, leather is dried and trimmed. This completes the process.

Very attractive leathers have been prepared in this manner depending of course on the design on the decalomania.

(b) *Finishing of splits with decalomania.* Splits from the splitting machine are assorted and shaved to level substance. Thin areas of substance below 0·5 m.m. are cut off. Shaved splits are loaded in a drum with a float of 200%,



run for 20 minutes and drained. The wash is repeated once again, the bath drained and stock refloated with 200% water. 1·0% sodium bicarbonate is added and run for 20 minutes and drained, washed once with 200% water and drained. Stock is refloated in 150% water at 70°C and fat liquored with 5·0% sulphated pongam oil (CLRI make). The splits are pulled out and piled. A thick paste of 3% corn flour in 30% water is made by cooking. 5% China clay is added and the stock run in this paste for 20 minutes. The splits are pulled out, dried, aged for 2 days, conditioned as usual, staked and tacked on boards to dry. After drying they are trimmed and buffed with 180, 280 and 400 papers on the side to be finished and with 180 emery papers only on the rough side. On the side to be finished buffing should be quite close and there should be no raised fibres. Buffed surface must be smooth.

After buffing, the leather may be decorated with decalomania as described for grain leathers.

*II. Hand printing of leather.* Leathers can be printed in many designs and colours as in the textile industry using wooden blocks. Attractive finishing can be done even on poor quality leathers. A process is given below:—

Inferior rejection of sheep skins of E.I. tannage are shaved level and buffed on the grain with 320 paper. The buffing dust is brushed off and the leathers stained with a 2·0% solution of Naphthalene Orange Gs, acidified with half its weight of formic acid. Then the leather is dried and is ready for printing.

Pigment pastes of blue, red, white and green colours are prepared in order to print a flower design.

The composition of the finish is:—

| | | |
|---|---|---|
| Water pigment paste | .. | 1 part |
| Acrylic polymer emulsion | .. | 1½ parts |

Pastes of the different colours are poured over felt pads covered with fine cloth to prevent the felt fibres coming off when the blocks are pressed on them. The component blocks are pressed on the appropriate colour pads and printed on leather. Care is taken to avoid crowding of the prints. A mark is made on the block to see that it is not reversed. Each component block in a design has to be fitted in its proper place. Single colour printing takes much less time than multi coloured. The proper positioning of the component blocks is easily mastered after a few trials.

When the entire leather surface is covered with the design, the leather is trimmed and topped with a nitrocellulose lacquer. The leather is aired off well until the lacquer is well dried. This completes the process.

Thus attractive designs may be put on even inferior quality leathers so as to increase the sale value of such leathers.



## TECHNICAL SEMINAR

### Interaction of Certain Phenol Hexamethylene Tetramine Complexes with Collagen*

S. RANGANATHAN

The finding that a simple addition complex prepared from resorcinol and hexamethylene tetramine had good tanning action yielding leathers having shrinkage temperature of 98°C, prompted a study of the nature of the reaction taking place.

Preliminary studies with the complex indicated that during tanning, the complex gets cleaved to resorcinol, formaldehyde and ammonia and that only resorcinol and formaldehyde are used up in tanning.

A study of the reaction of the complex with (a) Collagen (b) Deaminised collagen (c) Ultramid 6-A and also a study of the reaction of resorcinol formaldehyde mixture with collagen were carried out in this connection and the following observations made.

(1) Resorcinol and formaldehyde combine mainly with the primary amino groups of collagen probably with the formation of C-Mannich Base linkages.

(2) The reaction was found to be general over a vide pH range, but occurred best around pH 5 where side reactions were minimum.

(3) There is strong reason to believe that at pH levels greater than 7 some other groups of collagen, probably the guanidine groups, take part in the reaction.

The corresponding complex prepared from phenol did not react with collagen and the complex prepared from catechol did not exhibit any marked fixation.

* Summary of the seminar talk delivered on 3-3-1958.

# ABSTRACTS OF TECHNICAL PAPERS

**Submitted at the Symposium on Leather Auxiliaries**
**14th—17th March, 1958.**

## TECHNICAL SESSION No. I.

STUDIES ON KHARI SALT — PART I. *S. C. Nandy & S. N. Sen, Central Leather Research Institute.* Khari salt is one of the important curing agents available in India, especially for dry salting of hides and skins. Khari salt is known to be composed of several constituents with a considerable amount of earthy matter. The suitability of Khari salt for dry salting has been studied in relation to its moisture absorption at different conditions of humidity.

ASSESSMENT OF THE UTILITY OF CERTAIN COMMERCIAL SAMPLES OF LIME. *S. Nagarajan & T. S. Krishnan, Central Leather Research Institute.* Some samples of lime and calcium carbide waste have been tested in regard to their use in the leather industry.

THE POSSIBILITY OF THE USE OF BARIUM SULPHIDE AS A SUBSTITUTE FOR SODIUM SULPHIDE IN TANNING INDUSTRY. *S. C. Datta, Council of Scientific & Industrial Research.* Complete depletion of the natural deposits of Sodium sulphate in Rajasthan has considerably affected the Sodium sulphide industry and the price of the product has nearly doubled. The present paper deals with the possibility of use of Barium sulphide as a substitute for the same in the tanning industry.

THE PREPARATION OF SODIUM HYDROSULPHIDE. *J. C. Sen, D. Ramaswamy & Y. Nayudamma, Central Leather Research Institute.* Sodium hydrosulphide is used extensively in foreign countries as a sharpening agent for depilating as it possesses some advantages over sodium sulphide. Attempted preparations of the compound are discussed in the paper. The difficulties in preparation consequent upon the unstable nature of the pure hydrosulphide are outlined.



ENZYME BATES AND DEPILANTS FOR LEATHER MANUFACTURE. *S. M. Bose, Central Leather Research Institute.* Enzyme bates and depilants are important leather auxiliaries. A review of the researches carried out at the Biochemistry Laboratory of the Central Leather Research Institute on the production and uses of enzyme bates and depilants for leather manufacture is presented. The merits and demerits of unhairing by enzymes and the possibility of using enzymes as dewooling agents are also discussed. Several aspects of the action of bating enzymes on skin constituents are also explained.

SOME TECHNIQUES FOR THE ENZYME BATE PRODUCTION AND THEIR USE. *S. C. Dhar & S. M. Bose, Central Leather Research Institute.* The factors influencing the production of enzyme bates from different sources and techniques for the production and use of bates have been discussed. The practical aspects of the bating process for the manufacture of different types of leather and the earlier and modern concepts of bating have also been discussed.

THE APPLICATION OF VERSENE FOR DETERMINATION OF CALCIUM AND MAGNESIUM IN SALTS USED FOR CURING HIDES AND SKINS. *(Miss) A. Nagasiromani, (Miss) P. V. Rajalakshmi & D. Ramaswamy, Central Leather Research Institute.* The determination of Ca and Mg present in salt samples used for curing purposes was carried out using the EDTA method with Eriochrome Black T and Murexide indicators. 60 samples of salt from different parts of India were collected and analysed for their Ca and Mg contents. Caution has been advocated in the use of salts containing as high as 1-2 % Mg, for curing hides and skins which go into the production of quality leathers, on account of the possible effect on salt stain formation.

INSTRUMENTAL METHODS FOR ASSESSMENT OF LEATHER AUXILIARIES. *D. Ramaswamy & Y. Nayudamma, Central Leather Research Institute.* Instrumental methods like spectrophotometry, electrophoresis, chromatography, polarography, nonaqueous titrimetry etc. are coming into prominence for the characterisation, analysis and assessment of several leather auxiliaries. An attempt is made in this paper to deal critically with some of the techniques with special emphasis on the work carried out at the Institute and the future scope of these techniques.

THE INFLUENCE OF DIFFERENT TANNING AUXILIARIES ON THE SWELLING OF HIDE PROTEIN. *S. Ghosh, Central Leather Research Institute & P. K. De, Calcutta University.* The swelling of hide or skin at every step of the manufacture of leather is an important factor determining some of the qualities of the resulting leather. The influence of some tanning auxiliaries (like surface active agents, lime liquors, tanning agents and the so-called "non-swelling acids") on the swelling of hide at the different stages of leather manufacture has been described. The formation of the shrunken grain in some tanbaths also has been discussed.

LEATHER AUXILIARIES AND THEIR USES IN THE MANUFACTURE OF LEATHER. *D. Woodroffe, Northampton.* The dye-stuff industry supplies a number of leather auxiliaries, used in dressing, dyeing fatliquoring and finishing of leathers. Some of the auxiliaries can be used in production of fuller and better leathers. Fatty auxiliary agents also have been developed.

PROBLEMS FACING LEATHER AUXILIARY INDUSTRY IN INDIA. *Y. Nayudamma & V. S. Padmanabhan, Central Leather Research Institute.* The problems facing the leather auxiliary industry in India are dealt with.

LEATHER AND OTHER ALLIED INDUSTRIES IN NEW MYSORE STATE. *N. R. Kembhavi, Hubli.* A plea is made for developing the leather industry in the New Mysore State, along with the other allied industries producing bone meal and tallow.

AUXILIARIES FOR LEATHER MANUFACTURE. *H. Loewe, BASF, West Germany.* By Leather auxiliaries are meant such substances which when applied in small quantities during leather manufacture, influence the processes and the products in a favourable manner.

From the chemical point of view these can be classified into the following heads namely :

(1) Those that give complexes with metal salts.

(2) Ionic products.

(3) Non-ionic products.



The first class of substances finds application in influencing the course of chrome tanning and in the removal of iron and lime stains in vegetable tannage.

Ionic products once again can be classified into acids, bases, anionic auxiliaries and cationic auxiliaries. Acids are used for the simple process of deliming, bases in liming as sharpeners and anionic and cationic auxiliaries for dyeing and as wetting agents. Syntans of amphoteric character are used for pretanning in vegetable tanning and retanning of chrome leather.

A FEW INDIGENOUS CHEMICALS IN TANNING AND LEATHER INDUSTRY. *M. B. Desai, N. G. Madan & D. C. Shah, The Kesar Sugar Works Ltd., Bombay*—The Chemical Industries of India, are providing to-day necessary processing materials to many industries including the Tanning and Leather Industry. The Photographic and Fine Chemicals Industry, especially, supplies Indian Leather Industry with useful chemicals like hypo, sodium bisulphite, sodium sulphite (anhydrous), potash chrome alum and sodium acetate, of quality conforming to standard specifications. The installed capacity with respect to these chemicals and the scope of their use in the Leather Industry are reviewed in relation to the increased production of leather in the country; it is concluded that the Indian Chemical Industry is quite vigilant of the growing requirements of the Tanning and Leather Industry.

## TECHNICAL SESSION No. II

BAGASSE REDUCED BASIC CHROME LIQUORS. *T. J. Devassy & Y. Nayudamma, Central Leather Research Institute*—A study of the optimum conditions for the preparation of basic chrome liquors by reducing acid dichromate with sugarcane bagasse, the chemistry of the chrome liquor so prepared and the practical tanning trials with the same are reported.

GLYCEROL REDUCED CHROME LIQUORS. *T. J. Devassy, V. S. Padmanabhan and B. N. Pal, Central Leather Research Institute*—Glycerol reduced chrome liquors have been prepared at the boil and with heat of reaction alone. The qualitative and quantitative investigations carried out with these are described.

A NOTE ON 'CHROMATOGRAPHIC SEPARATION OF ORGANIC ACIDS ON PAPER'. *V. S. Padmanabhan, Central Leather Research Institute*—The role played by correct adjustment

of pH value of the test and indicator solutions, in proper resolution of acid components is pointed out.

STUDIES IN CHROME LIQUORS: PART II: PAPER CHROMATOGRAPHIC INVESTIGATIONS. *V. S. Padmanabhan, Central Leather Research Institute*—In applying paper chromatography to investigation of chrome liquors, elimination of cationic interference was necessary. The results obtained after such elimination are considered in the light of information obtained by other means.

NEUTRALISATION OF CHROME LEATHER. *K. S. Jayaraman & Y. Nayudamma, Central Leather Research Institute*—The behaviour of certain complex active organic salts as neutralising agents for chrome leather has been investigated. The alteration they bring about in the nature and charge of the complex and consequent changes in the dyeing and fatliquoring properties of the leather have been studied. The specific advantage such as fullness and better feel in the leather obtained by the use of these salts have been pointed out.

ALUMINIUM TANNING SALTS AND THEIR APPLICATION IN PROCESSING OF LEATHER. *R. Selvarangan, M. A. Ghani, Y. Nayudamma and (Late) B. M. Das, Central Leather Research Institute*. The paper gives a brief account of the history of alum tawing and its draw-backs. It reviews the work done in alum tanning and describes the preparation of various basic aluminium salts—alone and in combination—and their uses in combination with mineral tanning agents like chrome, iron and zirconium tanning salts and organic tanning agents like tannin, watersoluble resins and formaldehyde. The aluminium tanning salt can be used advantageously in the manufacture of leather purposes. It can be used in the manufacture of uppers, sole leather, upholstery and fancy leathers. It can also be used as a mordant in dyeing.

SYNTANS AS AUXILIARIES IN LEATHER MANUFACTURE. *D. Mukherjee, Central Leather Research Institute*—Preparation of two types of syntans viz. Neradol and Novolac is briefly described. The use of these materials as bleaching, pretanning and retanning agents as well as for replacing the vegetable tanning materials is elaborately brought out with specific examples of work



done in this regard at this Institute with the materials prepared here.

SYNTHETIC TANNING MATERIALS AND THEIR IMPORTANCE FOR THE INDUSTRY OF VEGETABLE TANNED LEATHER IN INDIA. *R. Bosse, Leverkusen, Germany*—A review is given of the development of syntans, their classification and their technical uses outside and inside India. Especially stressed are the possibilities to economize vegetable tanning processes in India by the use of replacement syntans in combination with cheap indigenous vegetable tanstuffs.

COMPLEXES OF HEXAMETHYLENE TETRAMINE AND PHENOLS, IN TANNING. *S. Ranganathan, S. M. Bose and Y. Nayudamma, Central Leather Research Institute*—A number of complexes having good tanning properties have been prepared from hexamethylene tetramine and phenolic compounds. While hexamethylene tetramine alone has little or no tanning properties, the complexes obtained by treatment of hexamethylene tetramine with resorcinol, pyrogallol, catechol etc. exhibit good tanning properties. The complex obtained from phenol offers a sharp contrast in that it has no tanning action. The optimum conditions of tanning with resorcinol hexamine complex have been studied. In this type of tannage, hexamine acts as a donor of formaldehyde under various pH conditions.

CHROME RETAN LEATHERS: USE OF INDIGENOUS TANSTUFFS: PART I. *N. R. Sikdar & Y. Nayudamma, Central Leather Research Institute*—A study was made on the use of indigenous tanning materials in the retanning of chrome upper (chrome retan) leathers. The effects of the nature and amounts of vegetable tanning materials, fats, oils and waxes used, on the chemical and physical characteristics of fine leathers were studied and reported.

CHROME RETAN LEATHERS: USE OF INDIGENOUS TANSTUFFS: PART II. *S. P. Singaram & Y. Nayudamma, Central Leather Research Institute*—Several indigenous tanstuffs were tried for retanning chrome leathers meant for uppers. The combining value, tan value and water soluble content were determined. Similarly the increase in thickness on retanning was noted. From these results, the suitability of indigenous tanstuffs for retanning of chrome upper leathers was assessed.

THE SURFACE CHARGE OF CHROME TANNED LEATHER AND THE EFFECT OF ORGANIC ACIDS ON IT. *S. Ghosh, Central Leather Research Institute*—The surface charge and the isoelectric point of chrome tanned leathers have been determined electro-osmotically using samples tanned with anionic and cationic chrome as well as those of basic chromium sulphate tanned leather treated with oxalic, citric, tartaric and oxalic acid solutions separately. It has been shown that while cationic chromium raises the isoelectric point of hide, anionic chromium lowers it; the treatment of cationic chromium tanned leather with any complex forming organic acid also lowers the isoelectric point. The importance of these findings has been discussed in the light of tannery experience.

PLEA FOR TREATMENT OF DYEING AND TANNING SUBSTANCES ON THE SAME BASIS AS WATTLE EXTRACT AND WATTLE BARK. *P. V. Vittal Rao, A. V. Thomas & Co. (India) Ltd., Madras*—Syntans are now recognised to be important auxiliaries in the production of better leather, being available in various ranges. Hence it is urged that Government should consider these also as tanning materials along with wattle bark and wattle extract and extend similar import concessions.

## TECHNICAL SESSION No. III

POTENTIALITY FOR THE MANUFACTURE OF AND USE OF TANNIN EXTRACTS FROM INDIGENOUS TANNING MATERIALS. *R. Selverangan & Y. Nayudamma, Central Leather Research Institute*—The production, consumption and potential demand for tannin extracts in India, the characteristics of indigenous tanning materials and their availability, the possibilities for the manufacture of tanning extracts individually or in blends or by suitable chemical modifications for various uses are discussed.

PROBLEMS CONFRONTING TANNIN EXTRACT MANUFACTURERS IN INDIA. *J. K. Kothari, Myrobalan Extract Manufacturers' Association*—Myrobalan, a monopoly of India, is very largely exported to foreign countries, some of which are manufacturing extract out of it and making huge profits. In India, however, manufacturers of myrobalan extract are encountering many handicaps as a result of which factories cannot be run to



their full capacities; their margin of profit is very small. The main handicaps are the forest legislations, restrictions in railway transport which hamper the collection and transport of myrobalan nuts, imposition of inadequate duties on raw myrobalans to counterbalance the free import of it into foreign countries, rigid labour legislations and lack of assistance from Trade Commissioners in foreign countries to popularise our product.

BABUL BARK AND POSSIBILITIES OF ITS EXTRACT MANUFACTURE. *Kapurthala Northern India Tanneries Ltd., Kapurthala*—The author reports to have used babul bark and produced sole leather comparable with English sole leather. Babul bark is used along with myrob. in tannin. If babul extract is made, leach houses in the Indian tanneries will be empty as they are in Europe and more of myrobalan used in tanning would be processed extract. Babul extract may also be suitably modified as done in the case of chestnut and mimosa extracts.

EVALUATION OF THE PROPERTIES OF NATURAL TANNINS BY MEANS OF FRACTIONAL TANNING. *A. N. Mikhailov, Moscow*—Fractionation of natural tannins has been accomplished by fractional tanning, i.e., by repeated immersions of different pieces of hides in the same tannin solution. The volume formation index and the shrinkage temperature of the leathers so obtained have been determined and compared with similar data for untanned hide. The results are used to evaluate tanning properties of tannins.

PRODUCTION OF VEGETABLE TANNING EXTRACTS. *C. Valenta, Bata Shoe Co. Ltd., Batanagar*—In order to achieve self-sufficiency with respect to tanning materials India has to produce extracts from tanning materials other than myrobalan, also, either singly or in blends. Suggestions are put forth regarding regional survey of materials, trials with these on pilot plant and large scale, location of the extract factories and popularising the use of extracts.

THE NEED TO CHANGE OVER TO VEGETABLE TANNIN EXTRACTS. *E. C. Mathew & M. K. Udaya Varma, Central Leather Research Institute*—At present Indian vegetable tanning industry is confronted with a serious shortage of tanning materials. A plea is made, therefore to the Indian Vegetable Tanning Industry to change over to use of extracts, to surmount this partly.

RAPID SOLE LEATHER TANNAGE USING WATTLE SUBSTITUTES. *E. C. Mathew & M. K. Udaya Varma, Central Leather Research Institute*—Rapid tannage of sole leather has been done using Pithecolobium dulce, Peltophorum ferrugineum and Karada barks. The data are presented.

ROT-RESISTANT INSOLE LEATHERS—SOME RECENT DEVELOPMENTS IN SOUTH AFRICA. *L. M. Hill, S. G. Shuttleworth & R. L. Sykes, Leather Industries Research Institute, Grahamstown, South Africa*—Perspiration and iron grindery are amongst the causes of deterioration of conventional insole leathers: seepage water of low pH value also comes into the picture in the case of mineboot insoles. Two tannages, novel in the field were tried—a zirconium tannage and a chrome pretannage followed by retanning with a non-iron reactive replacement type syntan. While initial trials showed both these to be promising, exhaustive laboratory field tests decided in favour of the chrome-syntam combination tannages. The two commendable features of products of the latter types of tanning are high and rapid absorbancy of the insole leading to quick removal of perspiration and absence of cracking. Though the cost of insole leather so prepared is a little greater than that of the conventional type, this increase in cost is offset by the great improvement in serviceability. Even in regard to properties like wet stitch tear strength, tensile strength and elongation at break, the insole leathers prepared by the new method retain almost completely their original characteristics, after use for 3 months.

IMPREGNATION OF SOLE LEATHER. *J. Budaga Rao & Y. Nayudamma, Central Leather Research Institute*—The advantages of treatment of leather with synthetic and natural resinous materials are discussed. The various methods by which the resins could be incorporated into leathers are described with reference to specific compounds developed at this Institute.

NEW TANNING MATERIALS. *M. K. Udaya Varma & E. C. Mathew, Central Leather Research Institute*—The data on the use of three new tanning materials viz. Xylia xylacarpa, Terminalia paniculata and Terminalia tomentosa are presented.

SOME THEORETICAL CONSIDERATIONS PERTAINING TO THE MODIFICATION OF LIGNINSULPHONATES FOR



TANNING PURPOSES. *K. B. Mathur and S. K. Barat, Central Leather Research Institute*—Commercial waste sulphite liquors from the paper industry provide an abundant source of lignin-sulphonic acids and their salts, which may be suitably utilised as a raw material for potential tanning agents. Various possibilities of modifying this material chemically have been discussed in the light of hydrogen bonding theory of tanning mechanism.

ASSESSMENT OF THE TANNING POTENTIALITY OF SOME MODIFIED LIGNOSULPHONATES. *K. B. Mathur & S. K. Barat, Central Leather Research Institute*—The hydrogen bonding theory of phenolic tannages has led to the belief that the absence of real tanning properties in ligninsulphonic acid is due to the inadequate number of phenolic hydroxyl groups in the lignin molecule. Various derivatives of Magnesium lignosulphonate with high phenolic content were prepared, following condensation with phenolic substances such as Resorcinol, Phenol, polymeric phenol sulphonic acid and so on. The preliminary evaluation of tanning potential of these modified Lignosulphonates was done on the basis of their ability to combine with gelatin. Actual tanning tests with these materials were also performed using delimed goat skin pieces, and their tanning characteristics have been discussed with reference to certain physical properties of leathers produced.

FLAVOGALLOL—A CONSTITUENT OF THE TANNIN FROM POMEGRANATE RIND. *Otto Th. Schmidt and Werner Fickert, Heidelberg University, Heidelberg*—Flavogallol, a sesquiellagic acid has been isolated from the products of acid hydrolysis of tannins from pomegranate rind.

SURVEY OF INDIGENOUS TANNING MATERIALS: KAHUA BARK (TERMINALIA ARJUNA) *J. B. Rao, T. S. Krishnan & Y. Nayudamma, Central Leather Research Institute*—Modification of the objectionable red colour which Arjun bark imparts to the leather, has been made by suitably blending it with Cassia marginata or konnam in E.I. tanning of hides. The general appearance, colour, feel and other physical, chemical and microscopical characteristics of the leathers have been found to be comparable with those of the wattle tanned leathers. As a firm leather of a very high degree of tannage is obtained, attempts are being made to utilise it in sole leather tannage. This bark is suitable for the preparation of extracts as it can easily be leached and the extract gives a high percentage of tannin.

## TECHNICAL SESSION No. IV

SYNTHETIC PRODUCTS FOR LEATHER GREASING AND FATLIQUORING—COMPOSITION, PROPERTIES AND APPLICATION. *H. Grunewald, Farbwerke Hoechst AG., Hoechst*—The composition, properties and applications of the Derminol products, used for leather greasing and fatliquoring are discussed in a detailed manner.

PETROLEUM PRODUCTS FOR THE LEATHER INDUSTRY. *T. V. Jagadeesan, Standard Vacuum Oil Co., Madras*—The petroleum products are characterised by high degree of penetration, better lubricating properties, nonoxidisability and chemical inertness. By using blends of these products with fatty oils, burning of leather, spue formation and loose grain are eliminated and the leather produced has greater firmness and is more waterproof. Thus petroleum products are vital auxiliaries in the production of high quality leather. The scope of utilisation of these products is indicated in this article.

SURFACE ACTIVE MATERIALS AS AUXILIARIES IN LEATHER INDUSTRY. *M. A. Ghani, V. R. Kishore and K. N. Shama Sastri, Central Leather Research Institute*—The authors after describing the characteristics of the different types of surface active materials give details of the various operations where these materials find use in the leather industry, not only in processing of leathers but also in the fabrication of leathers and leather bye-products.

EMULSIFIERS FOR USE IN LEATHER INDUSTRY—PART I. *V. Radhananda Kishore, M. A. Ghani & K. N. Shama Sastri,, Central Leather Research Institute*—The different classes of emulsifiers have been outlined with details of preparation and uses in leather manufacture. The mechanism of emulsification is briefly described. Certain emulsifiers of the anionic, cationic and non-ionic types were prepared at this Institute in a laborartory scale, and utilised in fatliquoring of leather in small lots. Interesting results have been obtained and it is proposed to continue these investigations in order to develop the processes on commercial scale after examining the economics of the processes.

SULPHATED OILS PREPARED AT THE CENTRAL LEATHER RESEARCH INSTITUTE AND THEIR USE ON LEATHER *V. V. Muralidhara Rao, V. Radhananda Kishore and*



*Y. Nayudamma, Central Leather Research Institute*—The use of sulphated oils and the importance of the fatliquoring operation in leather manufacture have been described. The different classes of emulsifiers are enumerated specially to bring out the important role of sulphated oils in leather industry. Recent advances in the large scale manufacture of these products especially in U.S.A. are described briefly. Processes that have been developed at this Institute for sulphation of various oils like Pongam, Fish, Neatsfoot, Rice bran and Tobacco seed are dealt with at length, along with the application of these oils on different varieties of leathers.

CATIONIC, NONIONIC AND MULTICHARGED FATLIQUORS. *C. E. Retzsch, Nopco Chemical Co., Harrison, New Jersey, USA*—The developments in the field of fatliquoring, using anionic, cationic and nonionic products, singly or in blends or in stages, are outlined and the scope for future investigation and development is indicated.

THE UNIT PROCESS OF SULPHONATION. *K. Chandrasekharan, A. C. College of Technology, Madras*—Manufacture of a good number of leather auxiliaries involves sulphonation (or sulphation) as an important step. The essentials of this process, i.e., its chemistry, plant procedures and equipment are presented.

INDIGENOUS FISH OIL FOR THE TANNER. *G. P. Madhavan, Gordon Woodroffe Leather Manufacturing Co., Madras*—The different methods of treatment of leather with oil have been enumerated with the mechanism of treatment. The importance of cod oil to the European tanner and the corresponding use of indigenous fish oil by the Indian tanner have been stressed.

The fish oil of West Coast at present contains too much of impurities rendering its use without refining very unsafe, especially if the treated leathers are to be exported to foreign markets where spewing troubles may be encountered.

The chemical characteristics of fish oils suitable for the different usages on leather are given,, and the necessity of conducting research in the proper blending the fish oils of high iodine value with vegetable oils to evolve a good currying oil, has been pointed out. Mackay test for determining the oxidisability of fish oil has been described in full with the importance of this test.

The duty, on the one hand, of the fish oil manufacturers to improve the quality of fish oil and increase the quantity by adopting modern techniques and on the other, of our Government to permit the free import of fish oil till the country attains self-sufficiency in this product is clearly brought out as otherwise the country cannot become self-sufficient in industrial leathers, in the near future, this oil being required imperatively for such leathers.

USE OF MODIFIED SUGARCANE WAX IN LEATHER POLISHING. *V. V. Mhaskar, National Chemical Laboratory, Poona-8.* India is importing waxes like carnauba and montan worth about 10—12 lakhs rupees, for the manufacture of leather polishes, floor polishes, car polishes etc. In addition to this, wax polishing compositions valued at Rs. 10 lakhs are also imported.

India has no natural source of waxes like carnauba wax. Sugarcane wax is the only indigenous wax which can be made abundantly available. The crude cane wax gives good gloss on application, but it has some major draw-backs like its dark colour, stickiness and poor solvent take-up property and therefore, has not much industrial use. As a result of the work carried out during the last few years at the National Chemical Laboratory, a process has been evolved which includes oxidation of the crude cane wax and chemical modification of the oxidized wax to obtain modified waxes. By this process it is possible to prepare modified sugarcane wax which can be utilised fairly satisfactorily for the manufacture of leather polishes in place of carnauba and montan wax. The only drawback is that the creams prepared from this wax are a little softer above 40°C.

The above process for the modification of sugarcane wax and its utilisation for the leather polishes are discussed.

SUGAR-CANE WAX FOR SHOE POLISHES. *G. S. Rama Iyer & Y. Nayudamma, Central Leather Research Institute.* Large quantities of sugar-cane wax, a byproduct of the sugar industry were being thrown away. Now, there is one plant operating in the United States (and another has probably started working in Australia) for the recovery and refining of the crude wax to obtain a hard wax possessing polishing properties. In India tens of thousands of tons of sugar-cane wax are still going to waste every year. The National Chemical Laboratory at Poona has developed processes by which the crude wax is bleached and modified chemically into different derivatives. Two of the hard waxes thus obtained were tried in shoe creams with good results.



A NATURAL LATEX BASED ADHESIVE FOR LEATHER. *G. S. Rama Iyer & Y. Nayudamma, Central Leather Research Institute.* Several adhesive compositions with rubber latex (Hevea brasiliensis) as the main ingredient were prepared and tried on leather. The experiments led to the formation of a latex-cement which has been found to be satisfactory. This latex-cement is now being sold at Rs. 7/- per imperial gallon (i.e. Rs. 5·60 per gallon) against orders from the local leather goods manufacturers.

COATED ABRASIVES IN LEATHER & SHOE INDUSTRIES. *U. Mohan Rao, Carborundum Universal Ltd., Madras.* The paper deals with the following : — General ideas about coated abrasives; Different types of grain and backing; Manufacturing Technique: Gravity and modern Electrostatic coating; Open and closed coats; Flexing Process and Silking Process; Buffing of leather: Grain side and flesh side—use of flint, silicon carbide and aluminium oxide abrasives; Different types of buffing machines; Abrasives in Shoe Industry: Use of glass paper and flint paper for hand sanding and use of garnet and silicon carbide paper and cloth combination materials in machines.

A COMPARATIVE STUDY OF THE MECHANICAL PROPERTIES OF CHROME RETAN UPPER LEATHERS. *N. Ramanathan & (Miss) D. V. Subbalakshmi, Central Leather Research Institute.* The tensile strength, elongation, tongue tear strength, double hole stitch tear strength, grain crack strength, bursting strength and stiffness factor of light and heavy chrome retan leathers are compared. It is found that chrome retan stuffed leathers possess better mechanical properties than chrome retan fatliquored leathers. The order of merit from the point of view of the mechanical properties has been arrived at for chrome retan light leathers; Myrob and Quebracho are first, followed by Gambier and Wattle, while Cutch occupies the last place.

THE APPLICATION OF QUALITY CONTROL TO LEATHER RESEARCH AND INDUSTRY. *S. Venkataraman & T. S. K. Mahadevan, Central Leather Research Institute.* The possibility of applying Quality Control techniques, to Leather Research and Industry, with advantage has been reviewed. Also the difficulties

that may be encountered while applying the quality control techniques are given with some suggestions to overcome the same.

## CONCLUDING SESSION

PIGMENT FINISHES FOR LEATHER. *E. S. Subramanian, Handymen Industries Private Ltd., Madras.* Pigment finishes occupy an important position amongst the various finishes at the disposal of the leather finisher. The different materials that go to constitute these finishes are considered.

MANUFACTURE OF WATER PIGMENT FINISHES FOR LEATHER AND ITS PROSPECTS IN INDIA. *J. C. Deb, Central Leather Research Institute.* After stressing the important role of water pigments in leather finishing, the necessity for their production on a larger scale under standardised conditions is stressed. A brief account is also given of the essential ingredients along with their specific roles in the finish formulation and the difficulties encountered by the leather manufacturer in the procurement of his requirements; the author suggests ways to circumvent them, on the lines, the finish manufacturers in Western countries serve their customers.

RESIN EMULSIONS—FINISHING AUXILIARIES. *J. B. Rao & Y. Nayudamma, Central Leather Research Institute.* The use of resin emulsions in leather finishes has become a standard industrial practice during the last few years. A discussion of the problems of polymerising these emulsions is presented. By scientific blending mixing and selection, suitable resin emulsions can be made to meet the necessary requirements and much of the leather produced today is finished with finishes of this type. Most of the resin emulsions are at present being imported into our country. Work has been initiated at the C.L.R.I. to develop suitable resin emulsions. The monomers methyl acrylate and methacrylate have been chosen as raw materials. Emulsion of copolymers of methyl acrylate and methacrylate have been prepared and have been found to be good and economical substitutes for the imported resin emulsions like the Fast coating bottom and Bedacryl. Attempts to modify the abundantly available naturally occurring shellac resin and make suitable emulsions like the synthetic resin emulsions like the synthetic resin emulsions have been encouraging.

LEATHER FINISHES: ALKYD RESIN FINISHES. *T. K. Parthasarathi & A. Ganesan, Central Leather Research Institute.*



The different types of alkyd resins that can be used in leather finishes are discussed in this paper with particular reference to drying type of alkyds. This paper refers to the work done with Maleic and Linseed alkyds and alkyd emulsions for application in leather industry particularly for the village tanners.

SOME IMPORTANT BINDERS—NATURAL AND SYNTHETIC. (A REVIEW). *G. S. N. Murthi, Gordon Woodroffe Leather Manufacturing Co., Madras.* Finishes occupy an important place today in the Indian Leather Industry in view of the generally poor quality of leathers. Binders which are important constituents of finishes, can be of natural or synthetic origin. Some of the important substances of the two types are considered in a detailed manner, with regard to the optimum conditions of their application.

NITROCELLULOSE SOLVENTS AND DILUENTS—TYPES AND USES. *U. A. Menon, Gordon Woodroffe Leather Manufacturing Co., Madras.* The different types of solvents used in the preparation of nitrocellulose lacquers are dealt with, with reference to viscosity of resulting solutions, evaporation rate and solvent power.

A PRE-REQUISITE FOR INCREASE IN THE INDIAN TANNING & LEATHER WORKING INDUSTRY. *Batliboi & Co., Madras.* An appeal is made for liberalising and facilitating import of machinery and equipment needed for tanning and leather working operations.

## INAUGURATION OF THE LEATHER AUXILIARIES SYMPOSIUM AND THE LEATHER FAIR

The Symposium on Leather Auxiliaries and the Leather Fair were inaugurated on 14-3-58 at the Central Leather Research Institute, Adyar, by the Union Finance Minister, Shri Morarji Desai and Prof. M. S. Thacker, Director-General of Scientific and Industrial Research, respectively.

The function was presided over by the Governor, Mr. Bishnuram Medhi. Over 180 delegates from all over India attended, besides delegates from the U.S.S.R. & the Philippines, distinguished guests, traders, technologists, tanners, manufacturers and officials.

Dr. Y. Nayudamma welcomed the gathering on behalf of the Symposium Committee and Leather Fair Committee.

Mr. M. J. Jamal Mohideen, representing the Indian leather trade and industry, said India produced in a year about 20 million cattle hides — about 90 % of them from animals dying of old age and natural causes — 35 million goat skins and 17 million sheep skins, valued at about 400 millions of rupees in raw state. Of this about 17 millions of goat skins worth about 60 million rupees were exported in raw state itself. The rest was converted into leathers and leather articles valued at more than 500 million rupees. However, of these, 250 to 300 million rupees worth of leather and leather articles only were exported to foreign countries and the balance consumed internally. If wattle bark and mimosa extracts only were used for tanning all these, the Industry would require about 67,000 tons of wattle bark and half that quantity of mimosa extract per annum. But the very fact that they were importing only about 7,000 tons mimosa extract definitely showed that the industry was using indigenous tanning materials to a large extent and was importing only the bare necessity. This import could be progressively reduced when wattle bark or some other tanning material equal in quality was available in large quantity to the industry in the country. He was glad that the Central Leather Research Institute had been from its very inception trying hard



to tackle this problem, and had found some substitutes. He thought the Institute had discharged its responsibilities in quite an appreciable manner.

Inaugurating the Symposium on Leather Auxiliaries, Prof. M. S. Thacker, pointed out how invaluable had been the help and advice given by Mr. Morarji Desai on problems facing the research laboratories. He would say that but for the help received from the Minister many of the researches made in the laboratories would not have been translated into industrial production.

Prof. Thacker observed that the work of research laboratories in the country — they had about 18 and the 19th one was in the course of establishment — were geared up to undertake and process the problems not only of what scientists thought it would be good for the country but of such problems which the Industry would throw on to the laboratories.

He said that in order to make available to the industry outside, the results of the experiments undertaken by the laboratories, they were contemplating a proposal to establish extension services not only here but in other regions also. He would at the same time tell the industry 'Please let us have your problems and we shall tackle them'.

Prof. Thacker said he understood that whereas small industries were anxious to take what the laboratories offered them, the larger industries were not so inclined. He would make a request to the industrialists, large and small, that the laboratory was a joint venture and unless they and the Government worked together, 'we cannot go far ahead'.

Referring to the indigenous production of the auxiliary materials for the leather industry, Prof. Thacker said that scientific and technological contributions had been made by his colleagues in other parts of the world. They in the Council of Scientific and Industrial Research would await the deliberations at the Symposium with great interest and great expectations. He would also request the Association of Hides and Skins to pool their knowledge and experience of the work they had done towards auxiliaries with the work that had been done by the laboratory.

To his colleagues — the scientific workers in the laboratory — he would make a mention — the memorable mention of the announcement by the Prime Minister of the Scientists' Charter. He would not go into it.

Mr. Morarji Desai, inaugurating the Leather Fair, said that he had an opportunity some months back of going round the Institute and knowing what it had been doing. This was one of those great laboratories which had been started and which had been working very usefully. He was struck by the admirable work that had been done so far in the Institute, and was very happy to see that the leather industry of our country was considerably helped by the original and useful work that was being done there.

Mr. Morarji Desai said he was glad that the Leather Fair was organised because it was necessary for people to know where their leather industry stood, its possibilities, its actualities, advances so far made and yet to be made, so that full use could be made of the valuable work that was being done at the Institute, as elsewhere in the country. Researches were not made only as a result of good means or good buildings or good opportunities, but due to the intensity of purpose of those who were engaged in research work and more especially of the person who was in charge of the work and responsible for it. 'I do not think this Institute could have had a better Director than the one it has at present' (*Applause*).

He said their attention should be directed to producing all that they wanted and even more than what they wanted so that they would be able to send out more and more things. He could not say they had reached the standards in tanning and finishing reached in some countries of the world which were very much advanced in this respect. They had yet to reach those standards and he had every hope that the work that was being done at the Institute would enable them to produce goods not inferior in either quality or usefulness but superior to any from elsewhere, because they had all the resources here to make the best leather. He hoped that the Leather Fair which he was inaugurating would be a step forward in this direction of making their leather industry the best in the world not from the point of view of competing with other people but from the point of view of utilising their resources—both human intellect and industrial resources—to the



maximum capacity for the happiness of their own and other people.

The Minister added that leather was useful in every way. But it sometimes led them into the realms of cruelty. He only hoped that in their desire to have better and better leather they would not resort to methods which would involve cruelty to animals.

Prof. A. N. Mikhailov, a delegate from the USSR. conveyed on behalf of leather chemists and engineers of Soviet Russia their best wishes to the leather industry in India, and hoped the Institute would be of great benefit to the industry.

Messages of good wishes were received among others from the Speaker of the Lok Sabha, Mr. M. Anantasayanam Iyengar, Union Ministers Mr. A. P. Jain and Mr. K. C. Reddi, the Speaker of the Madras Assembly, Dr. U. Krishna Rao and Foreign Leather Scientists.

## GOVERNOR'S ADDRESS

Mr. Bishnuram Medhi, who presided said the Symposium would give ample opportunities to the specialists to read and discuss technical papers on the various aspects of the industry. Problems of finding raw materials, supply of aids and auxiliaries in the various stages of production and manufacture and finding suitable markets could be discussed freely and frankly in order to formulate clear and constructive suggestions for the all-round improvement of the leather industry, he said.

The Governor added that from time immemorial, leather had always been used by human beings to cover their bodies. It was said that the use of leather was even more ancient than the use of barks. As human civilisation advanced and as man developed his wants and tastes, new processes were discovered in order to cure and preserve raw hides and skins and to give them better finish, and later to manufacture useful articles of ware with beautiful and delicate workmanship.

The Governor added that the South Indian tanning industry tanned hides and skins by vegetable tanning. Processes had been evolved by local tanners by practical experience over more than

one hundred years. The utility and excellence of the products manufactured had been such as to find a market for them almost throughout the world. He further pointed out that Madras had also some of the biggest organised tanneries, producing a variety of finished leathers, industrial leathers and other leathers. The State had the unique privilege of having has the first institution of leather technologists in India, viz., the Institute of Leather Technology at Washermanpet, where foreman and certificate holders were trained both in the manufacture of leather and leather goods. Madras was also singularly fortunate in having one of the national laboratories viz. the Central Leather Research Institute.

Referring to the Five-Year Plans formulated with a view to improving their economy and bringing about all-round balanced development, the Governor said that they as specialists would have to take many aspects of the industry into consideration, exchange notes with others and formulate proposals for future expansion and improvement. He wished them all success in their deliberations.

Mr. M. A. Ghani proposed a vote of thanks.



## NOTES & NEWS

### *Donation for a fellowship at the Central Leather Research Institute*

Shri A. Nagappa Chettiar, Managing Director, India Leather Corporation Private Ltd., has announced, in the name of the firm, an endowment of Rs. 2,500/- for instituting a fellowship for research, at the Central Leather Research Institute, Madras, 'in recognition of the need for research in the E.I. Tanning Industry'. This is the first instance of the Leather Industry voluntarily coming forward with a donation, realising the need and value of research. The announcement was made on the occasion of declaring open the Modern Warehouse of the India Leather Corporation Private Ltd., by Shri R. Venkataraman, Minister for Industries, Madras State, on 14-3-58. The electric baling press and electric hoist in the warehouse were switched on by the Minister for Electricity, Shri V. Ramiah, while the testing laboratory and the technical library were declared open by Prof. M. S. Thacker, Director-General, Scientific & Industrial Research, Government of India. Mrs. Tara Cherian, Mayor of Madras, declared open a canteen for the staff.

### *The Leather Auxiliaries Symposium*

The Symposium on Leather Auxiliaries was held at the Central Leather Research Institute, Madras, from 14-3-1958 to 17-3-1958. 62 papers contributed by Indian and Foreign authors were submitted at the Symposium in the course of its five technical sessions; the papers dealt with the different aspects relating to the Leather Auxiliaries Industry. The participants in the Symposium were not from amongst Scientific workers only but from all the industries connected with the Leather Trade also. Prominent amongst the delegates from outside were Prof. A. N. Mikhailov and Ingenieur Goldobenkov of the U.S.S.R. On the last day of the Symposium, there were special lectures by the Russian Delegates about Leather Research and Leather Industry in the U.S.S.R. The papers submitted and the Proceedings of the Technical Sessions will be shortly published as a separate volume.

*The Leather Fair*

On the occasion of the Symposium, a Leather Fair was organised by a committee specially constituted for the purpose. The Fair was kept open from 14th to 29th March, 1958. Prof. Thacker, Shri Morarji Desai and the distinguished delegates and invitees went round the Fair after its inauguration.

The Fair was got up with the enthusiastic co-operation of no less than fifty participants representing the Leather and the Leather Auxiliaries Industry— E. I. Tanners, Manufacturers and suppliers of Tanning Materials, Industrial Leather Manufacturers, organised industries producing a variety of leathers, Chrome tanners, Reptile Leather Manufactures, Suppliers and Manufacturers of various Leather Auxiliaries and Machinery and Leather Goods Industry. Exhibits were received from Germany, United Kingdom, United States of America, Burma, Indonesia and Japan also. The Fair elicited much interest and appreciation.

*Leather Auxiliaries Drafting Sub-Committee*

A Leather Auxiliaries Drafting Sub-committee was constituted, to put forth recommendations for the advance of the Leather Auxiliaries Industry. It consisted of :—

(1) Shri J. K. Kothari, M/s. Lakshmi Tannin Extract Manufacturing Co., Kharagpur—President.
(2) Shri T. V. Jagadeesan, Standard Vacuum Oil Co., Madras.
(3) Shri U.A. Menon, M/s. Gordon Woodroffe Leather Manufacturing Co., Madras.
(4) Shri N. Viswanathan, M/s. Chemicolour Ltd., Calcutta.
(5) Shri E. S. Subramaniam, M/s. Handymen Industries Private Ltd., Madras.
(6) Dr. S. K. Barat, Central Leather Research Institute, Madras.

The recommendations of the Sub-Committee were submitted at the Concluding Session of the Symposium on 17-3-1958 and adopted. The recommendations were on the following lines :—

(1) The Leather Fair be an Annual feature organised by the trade itself.
(2) Steps be taken for obtaining full data about the indigenous vegetable tanning materials and for ensuring steady supply of the same.



(3) The Leather Industry be supplied with standard quality of fish oil.
(4) A survey of the country's requirements with regard to the Leather Auxiliaries and the potential supply from existing plants be made and steps be taken for providing the leather industry with the necessary imported auxiliaries.

*'At Home' & Dinner to the Delegates*

A Committee of Hosts, representing the Leather and the Leather Auxiliaries Industries were 'At Home' to the delegates to the Symposium, on 15-3-58 at the Central Leather Research Institute, Madras. Mr. M. Bhaktavatsalam, Home Minister, Madras State, was the Chief Guest.

In welcoming the chief guest, Mr. C. K. Duraivelan said that the leather industry was bringing to the country about Rs. 24 crores worth of foreign exchange, sterling and dollar. He said that a problem facing the industry, was with regard to getting a good supply of raw hides, especially after the separation of Pakistan.

Mr. T. Abdul Wahid said that the E. I. tanning industry had to be gradually replaced by the finished leather industry. He said that to-day the export of E.I. tanned leather had come down to 2,000 bales from 3,000 to 4,000 bales, which was due to the higher cost of production and the fact that foreign buyers were not prepared to pay high prices.

Mr. E. S. Subramanian next spoke. Mr. K. J. Kothari of Kharaghpur thanked the organisers of the Symposium for bringing together the technologists, the tanners and leather auxiliary manufacturers on a common platform.

*Minister's Appeal to Tanners*

Mr. Bhaktavatsalam, speaking next, said that the leather industry was very important to India in many ways, especially as an earner of foreign exchange. The Symposium was unique and very useful. He said that the Research Institute had been a most valuable acquisition of Madras State, and he hoped that the activities of this Institute would be expanded further before long. He also expressed the wish that more and more finished goods

would be manufactured and exported to other countries fetching even more foreign exchange. He appealed to the tanners to take the fullest advantage of the results of researches conducted at the Institute by enthusiastic, able and devoted research workers. He assured that the Government would extend their help in solving the problems and difficulties which faced the industry. The E.I. tanned leather had won a great reputation in foreign countries and he appealed to the tanners to keep up that reputation.

Mr. N. Viswanathan of Calcutta proposed a vote of thanks.

After the function, there was a programme of entertainment.

The delegates were entertained to a Dinner on 16-3-58 by the Committee of Hosts, at the Central Leather Research Institute with Dr. A. Lakshmanaswamy Mudaliar, Chairman, Executive Council of the Central Leather Research Institute and Vice-Chancellor, University of Madras as the Chief Guest.

Mr. R. Atkins of the Carborundum Universal Ltd., President of the Committee of Hosts, welcomed the gathering. Shri A. Nagappa Chettiar of the India Leather Corporation and Shri T. V. Jagadeesan of the Standard Vacuum Oil Co., spoke on behalf of the hosts. Shri Chettiar announced on this occasion that his donation of Rs. 2,500/- for instituting a scholarship at the Central Leather Research Institute would be tenable for one year. Shri M. A. Muthiah Chettiar, Rajah of Chettinad and Prof. M. S. Thacker, also addressed the assembled guests and Prof. A. N. Mikhailov of the USSR replied on behalf of the delegates. The Chief Guest, in the course of his speech referred in appreciative terms to the work of the Institute. Shri U.A. Menon of Messrs. Gordon Woodroffe Leather Manufacturing Co. Ltd., proposed a vote of thanks.

Earlier, the delegates witnessed a Bharata Natyam dance performance by Kumaris G. Vasanti & G. Srimani.

*Tanning Training Centre for Ambur*

In order to improve the tanning industry in Madras State, particularly the finishing of East India leather, Government would be establishing a demonstration cum training centre at Ambur in North Arcot District at a cost of Rs. 600,000 in the next two or three months.

—*The Hindu* 16-3-58.



## RESEARCH BEARS FRUIT

*Practical Demonstration No. 1.*

(Second Series)

Process : Manufacture of chrome retanned upper leathers.

Period : 14th April to 10th May, 1958.

Place : Central Leather Research Institute.

A second series of practical demonstrations will be started from April. The first demonstration of this series will be on 'Manufacture of Chrome retan Leathers'.

You recall the process on chrome retan leather manufacture was demonstrated in January, 1957. Since that time the demand for the retan leather has increased for making civilian chappals and shoes and repeated requests have been received from the industry for the details of the process and the demonstration of the process again. Some tanners have already adopted the CLRI retan process in their tanneries.

Since June, 1957, additional researches have been undertaken on the chrome retan process and a process incorporating these researches will be demonstrated during April, 1958. If you are interested in this kind of work, you are welcome to send your representative to actively participate in these demonstrations.

## C. L. R. I. NEWS

Dr. Y. Nayudamma, Assistant Director-in-charge, has been appointed as Director, with effect from 13-2-58.

Dr. S. K. Barat, Senior Scientific Officer, Grade II has been promoted as Senior Scientific Officer, Grade I.

Sri N. Subramaniam, Junior Scientific Officer, has been promoted as Senior Scientific Officer Grade II.

Dr. D. Ramaswamy, Junior Scientific Officer has been promoted as Senior Scientific Officer Grade II

Dr. K. N. Shama Sastry, Junior Scientific Officer has been promoted as Senior Scientific Officer Grade II.

Shri J. B. Rao, Senior Scientific Assistant, has been promoted as Junior Scientific Officer.

Dr. V. S. Padmanabhan has been appointed as Junior Scientific Officer.

Mr. T. S. K. Mahadevan, Senior Laboratory Assistant has been promoted as Junior Scientific Assistant.

Mr. M. A. Ghani, Senior Scientific Officer, has been nominated as Principal Representative of the Council and Convenor, the Indian Standards Sub-Committee for Medium and light substance finished leathers, CDC 16:1.

Dr. S. K. Barat, Senior Scientific Officer, has been nominated as Principal Representative of the Council and Convenor, the Indian Standards Sub-Committee for methods of sampling and testing, CDC 16:5, and terminology CDC 16:6.

Mr. M. A. Ghani, Senior Scientific Officer, has been nominated as Principal Representive of the Council on the Leather finishes Sub-Committee CDC 16:8 of the Indian Standards Institution.

Shri A. Ganesan, Senior Scientific Officer, has been nominated as Alternate Member and Representative of the Council on the Leather finishes Sub-Committee CDC 16:8 of the Indian Standards Institution.

Dr. S. K. Barat, Senior Scientific Officer, has been nominated as Principal Member and Representative of the Council on the panel for vegetable tannins and tanning extracts CDC 16:5:1 of the Indian Standards Institution.

Dr. E. C. Mathew, Junior Scientific Officer has been nominated as Alternate Member and Representative of the Council on the panel for vegetable tannins and tanning extracts CDC 16:5:1 of the Indian Standards Institution.

Dr. Y. Nayudamma, attended the meeting of the Selection Committee for appointment of technical personnel to the C. L. R. I. at New Delhi on 11-2-58.



Dr. Y. Nayudamma, participated in the Symposium on Industrial and mechanical leathers organised by the Leather Technologists' Association in India at Calcutta from 9th to 12th February, 1958.

Shri A. Ganesan, visited Patna, Ranchi and other places in the Bihar State in connection with Extension Service work.

The CLRI Staff Club participated in the Shanti Swarup Memorial tournaments held at Delhi between 12th and 23rd February, '58

## VISITORS

| *Name* | *Date of visit* |
|---|---|
| Mr. R. S. Bhatt, Member Tariff Commission | 7-2-1958 |
| Mr. S. S. Mehta, Technical Director, Tariff Commission | " |
| Staff and Students of the Madras Veterinary College | 14-2-1958 |
| Mr. V. S. Hejmadi, Chairman, Union Public Service Commission, New Delhi | " |
| The Belgian Trade Mission | 15-2-1958 |
| The Parliamentary Delegation from USSR | 28-2-1958 |
| His Excellency Shri Bishnuram Medhi, Governor of Madras | 14-3-1958 |
| Hon'ble Shri Morarji Desai, Union Finance Minister designate | " |
| Hon'ble Shri M. Bhaktavatsalam, Home Minister, Madras, Madras State | " |
| Prof. A. N. Mikhailov & Ing. Goldobenkov Delegates from USSR to the Symposium | 20-3-1958 |
| Mr. V. Leitendorfer and Mr. A. Jelineck, Bata Shoe Co. Ltd. | " |

FORM IV

(See Rule 8)

| | |
|---|---|
| 1. Place of Publication : | Adyar, Madras-20 |
| 2. Periodicity of its Publication : | Monthly |
| 3. Printer's Name : | G. Srinivasachari |
| Nationality : | Indian |
| Address : | 21, Narasingapuram Street, Mount Road, Madras-2. |
| 4. Publisher's Name : | N. Subramanian |
| Nationality : | Indian |
| Address : | Central Leather Research Institute, Adyar, Madras-20 |
| 5. Editor's Name : | Y. Nayudamma |
| Nationality : | Indian |
| Address : | Director, Central Leather Research Institute, Madras-20 |
| 6. Name and addresses of individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital : | Central Leather Research Institute. (C.S.I.R.) |

I, N. Subramanian, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date : 1-3-1958.

(Sd.) N. Subramanian,
*Signature of Publisher.*



Editor Y. Nayudamma. Published by N. Subramanian, on behalf of the Central Leather Research Institute, Adyar, Madras-20. Printed by G. Srinivasachari, B.A., at the G. S. Press, 21, Narasingapuram Street Mount Road, Madras-2.