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H. R. H. Prince Philip, being taken round the Exhibition in the Tannery Building (above), and the Tannery (below), by Dr. Y. Nayudamma. Prof. M. S. Thacker and His Excellency Shri Bishnuram Medhi, Governor of Madras State, also are seen in the lower picture.

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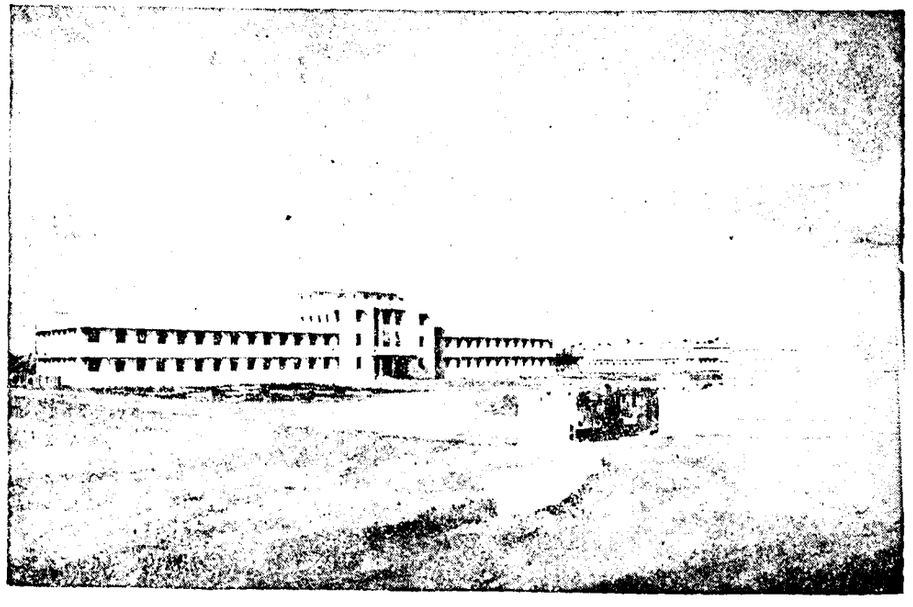

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

INDIA

NON-AQUEOUS TITRATION TECHNIQUE IN LEATHER RESEARCH—PART V

Analysis of Sulphated Oils

BY

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(Received in July 1958)

SUMMARY

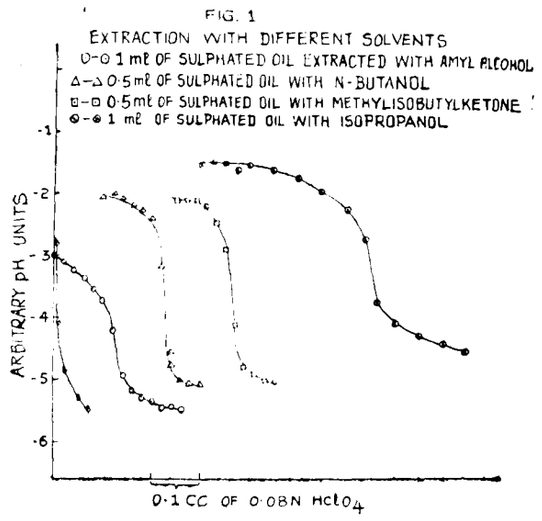
The development of a suitable non-aqueous titration technique for the determination of all the acid radicals present in fat liquors, viz., H_2SO_4, $-SO_3H$, $-OSO_3H$ and-COOH is presented in the paper. The method followed consists in extracting the fat liquor at neutral pH with 90% isopropanol and performing a series of titrations in non-aqueous media. The-COONa content is estimated by titration in glycollic medium with standard acid. The total organically combined sulphates together with the soap are determined by titration in glacial acetic acid medium after double decomposition with Hg(*ic*) acetate. Finally, the $-OSO_3Na$ is individually determined by hydrolysis with acid and differentially titrating the $NaHSO_4$ formed in glycol-acetone medium. The free fatty acids are also determined by titration in glycollic or other medium with standard alkali. The accuracy obtainable and the advantages of using this method for sulphated oil analysis over the chemical method are discussed.

Sulphated oils are commonly employed for fat-liquoring leathers to make them soft, supple and strong. A variety of vegetable, marine and mineral oils are made use of, for sulphation and sulphonation. The sulphation and/or sulphonation is accomplished by treatment of the oil with sulphuric acid under optimum conditions. The acid radicals present in such systems are: $-OSO_3H$, $-SO_3H$ and $-COOH$ in addition to the unreacted sulphuric acid. The commercial fat liquors are supplied in acidic or neutral and at times slightly alkaline forms. However, most of the

The paper was read by Dr. D. Ramaswamy, at the technical seminar held on 16-2-1959.

sodium chloride in a few instances and since the glycollic titration introduces errors in presence of sodium sulphate, especially if water is present,[6] it was found necessary to separate the inorganic salts from the rest to get the titre value corresponding only to the soap content. The solvents that have been tried are (1) n-butanol, (2) amyl alcohol, (3) methyl ethyl ketone and (4) isopropyl alcohol 90%. The results obtained are given in Figure 1. It is seen that low values are obtained with butanol-amyl alcohol and methyl ethyl ketone. Complete extraction could not be effected with these solvents even if extraction was carried out a number of times. The percentage of extraction also varied with the different samples of oils taken. With 90% isopropyl alcohol, however, the extraction of *organic* sulphates was found to be complete and quantitative, by estimating the organic sulphate in the residue which was found to be nil. The error introduced due to the extraction of sodium sulphate by 90% isopropylalcohol was found, by taking pure sodium sulphate for extraction, to be 5%.

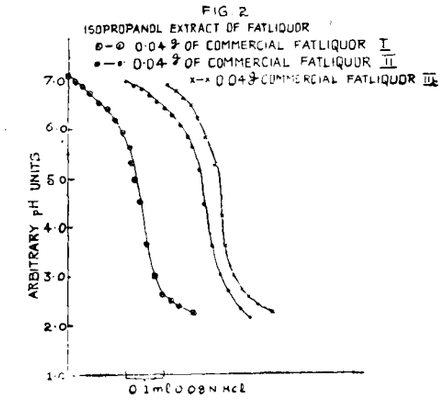
FIG. 1



The isopropanol extract of the fat liquors gave good and reproducible end points which were proportional to

concentration in glycollic medium (Figure 2). The titre value was computed to be equivalent to — COONa content of fat liquor and calculated in terms of mgm equiv. per 10 g of sulphated oil.

FIG. 2



Determination of —OSO_3Na (B) and —SO_3Na (C): The above titration of the extracted organic ester of the fat liquor with perchloric acid does not give the value due to the sulphuric ester content — OSO_3Na and salt of sulphonic acid — SO_3Na, since these groups are sufficiently acidic in glycollic medium to be not titratable with perchloric acid. A more acidic medium like glacial acetic acid or acetic anhydride was tried without success. Pifer and Wollish[7] determined salts containing sulphide, sulphite and sulphate in glacial acetic acid medium by first converting them into their corresponding acetates by treatment with mercuric acetate. The possibility of using this method for the determination of — OSO_3Na and — SO_3Na groups was examined. In order to develop the method for the successful titration of — OSO_3Na (*B*) a pure sample of sodium cetyl sulphate was prepared from cetyl alcohol and chlorosulphonic acid in ether medium, neutralising with excess of Na_2CO_3 and extracting the residue after evaporating the ether, with alcohol.[8] Also a sample of pure toluene sulphonic acid was neutralised exactly with

sulphated products are neutralised to pH 5 approximately, when these acid radicals are converted into salts, with the exclusion of a major part of fatty acid (— COOH). Since the emulsification of the oil and its penetration depend on the organically combined sulphuric acid groups, an accurate knowledge of all the acid radicals present in sulphated oils is essential in their manufacture.

The groups that are to be estimated in such systems are (a) free H_2SO_4, (b) $-OSO_3H$, (c) $-SO_3H$, (d) —COOH, (e) Na_2SO_4, (f) $-OSO_3Na$, (g) $-SO_3Na$ and (h) — COONa.

The chemical methods proposed for the determination of these radicals have been exhaustively dealt with by Burton[1] in his monograph. The chemical methods are known to be time consuming, elaborate and the results are somewhat arbitrary in some cases.

The possibility of applying the non-aqueous titration technique for the determination of the acid radicals in fat liquors has been suggested by Nayudamma.[2] In regard to the acid radicals, viz., H_2SO_4, $-SO_3H$, $-OSO_3H$ and — COOH contained in fat liquors, the same technique as applied to the study of syntans by Nayudamma[3] would be suitable except that it is not possible for differentiating between $-SO_3H$ and $-OSO_3H$ by this method. This method is only useful for studying the course of reaction and control of sulphation and sulphonation of oils during their preparation and analysis of acidic type of fat-liquors. But as most of the fat liquors are supplied at neutral pH and since most of the acids are present in the salt form, a study had to be undertaken for the determination of the various acid radicals present in the salt form. Methods so developed utilising the non-aqueous titration technique are presented in this paper. It may be pointed out here that such a method if developed could be applied for the determination of the acid radicals also since the acid radicals could be converted to their salt forms by adding known amount of standard alkali and then the method developed for the determination of acid radicals in the salt form, applied.

Experimental: A bench type Cambridge pH meter was used for recording the potential change. The titration was carried out in 50 ml beaker with Beckmann glass electrode 499°-80 type and methanol modified calomel electrode.

Reagents: 0·1*N* and 0·2*N* perchloric acid (Merck A.R.) in redistilled dioxan.

0·1 *N* Hydrochloric acid in ethylene glycol- n-butyl alcohol mixture (1:1).

0·1*N* and 0·5*N* sodium hydroxide in ethylene glycol-n butyl alcohol mixture (1: 1).

Ethylene glycol	— E. Merck, Reagent grade
n-Butyl alcohol	do.
Benzene	do.
Acetone	B.D.H. A.R.
Glacial acetic acid	do.
Acetic anhydride	L.R. B.D.H.

Mercuric acetate reagent: A saturated solution of mercuric acetate (E. Merck quality) in glacial acetic acid.

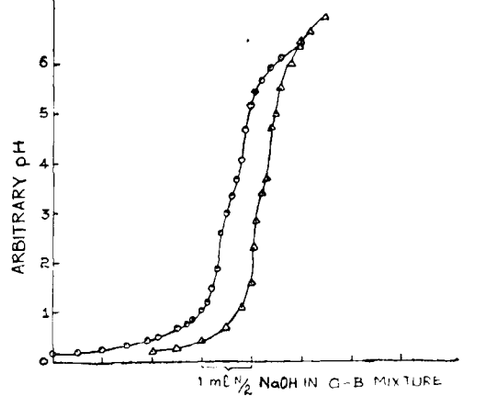
A microburet (2 ml or 5 ml) calibrated to 0·1 ml was used for addition of titrant.

Data and Discussion

Determination of —COONa (A): A method is available for the titration of soaps like sodium oleate in glycollic medium.[4,5] The fat liquors gave a well defined end point in glycol-butanol medium when titrated with 0·1*N* perchloric acid, in dioxan. However, since the sulphated products contain inorganic salts like sodium sulphate and

sulphuric acid and fatty acid is titrated in the same medium, 3 well-defined end points are obtained. Though during hydrolysis the soaps present in fat liquors are converted to the corresponding fatty acids, since fatty acid gives a separate end point, this method could be used for the determination of $-OSO_3Na$ alone because its hydrolysis product, i.e., $NaHSO_4$ is titrated separately without being influenced by the fatty acid. If sulphuric acid were to be used for hydrolysis as in the chemical method, the sodium sulphate formed from the soaps interferes with the determination of $NaHSO_4$ of the hydrolysis product and hence only hydrochloric acid had to be used. The hydrolysis, however, did not proceed to completion in nonaqueous medium. Hence the following procedure was adopted for the hydrolysis of $-OSO_3Na$ group. An aliquot of the isopropanol extract was pipetted out, 5 ml. of $0{\cdot}5N$ hydrochloric acid and 5 ml. of distilled water were added and evaporated slowly and carefully with controlled heating. When most of the water has been evaporated away, a mixture of 10 ml. of acetone

FIG. 5.
TITRATION CURVES FOR HYDROLYSED SAMPLES.
⊙-⊙ 1 g OF FATLIQUOR IN ACETONE-GLYCOL MIXTURE AFTER HYDROLYSIS WITH ACID
Δ-Δ 1 g OF SULPHATED PONGAM OIL ACETONE-GLYCOL MIXTURE AFTER HYDROLYSIS WITH ACID

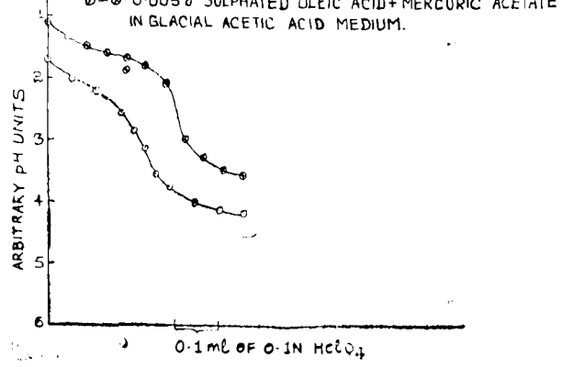


and 15 ml. of ethylene glycol were added and titrated with $0{\cdot}5N$ NaOH in G-B mixture. Even if some HCl escapes

during evaporation it does not hamper the result since $NaHSO_4$ is titrated separately from the residual acid. The typical curves obtained for two samples of fatliquors are shown in Figure 5. The first end point denotes the titre value for the residual hydrochloric acid and the second end point, due to the $NaHSO_4$ formed by the hydrolysis of $-OSO_3Na$ groups plus the original fatty acids (not shown in the figure). The difference between the second and first end points gives the hydrolysed $-OSO_3Na$ and hence the milliequivalents of $-OSO_3Na$ (B) for 10 gm. of the sulphated oil was found out. The $-SO_3Na$ group (C) was computed by subtracting this value from the combined $-OSO_3Na$ and $-SO_3Na$ ($B+C$) value obtained earlier.

Determination of sodium sulphate (D). Another titration was carried out by heating a known amount of the sulphated oil before extraction with isopropyl alcohol with mercuric acetate. This treatment converted the inorganic sodium sulphate also present to the sodium acetate which also

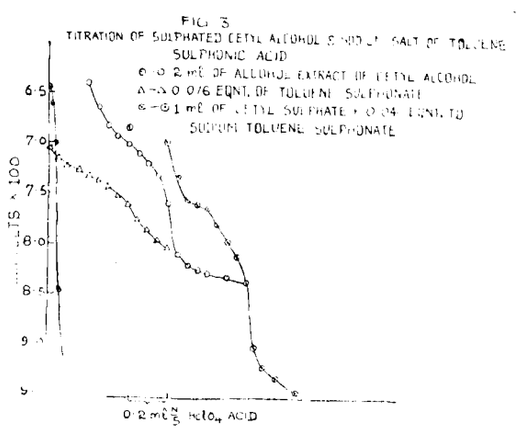
FIG. 6
TITRATION OF THE FATLIQUOR AS SUCH WITH AIDED MERCURIC ACETATE
O-O 0·5 mℓ OF FATLIQUOR + MERCURIC ACETATE IN GLACIAL ACETIC ACID MEDIUM
⊙-⊙ 0·005 g SULPHATED OLEIC ACID + MERCURIC ACETATE IN GLACIAL ACETIC ACID MEDIUM.



got titrated with acid (Figure 6). The titre value thus obtained, ($A+B+C+D$), gave after subtracting the value obtained with isopropyl alcohol extract treated with mercuric acetate the value for sodium sulphate alone (D).

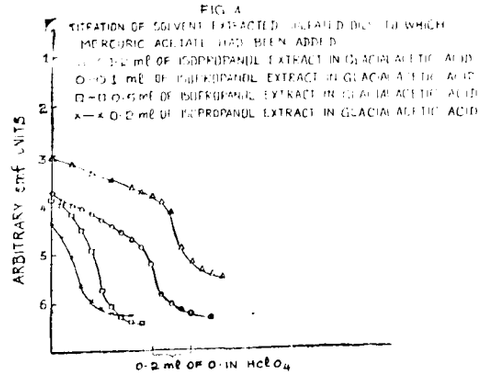
standard sodium hydroxide in non-aqueous medium to give a known sample containing only — SO_3Na groups.

The samples containing known equivalents of — OSO_3Na and —SO_3Na were taken and treated with 5-10 ml of saturated solution of mercuric acetate in glacial acetic acid and kept at 80°C for one hour to accelerate the double decomposition. The sample was cooled and to it were added 10-15 ml of glacial acetic acid and 10 ml of acetic anhydride and titrated potentiometrically with standard perchloric acid in dioxan. Figure 3 gives the curves for both the samples individually and also in mixture. The milliequivalents calculated for — OSO_3Na, by adopting chemical procedure and also by estimation of sulphur content as $BaSO_4$ and, in case of — SO_3Na, calculated from the strength and the volume of alkali added for neutralisation, agreed with the values obtained by non-aqueous titration technique within 2 % error, thereby proving the validity of the method.



When the isopropanol extract of the fat liquors containing — $COONa$ (A), —OSO_3Na (B), and — SO_3Na (C) was treated with mercuric acetate in glacial acetic acid, equivalent amounts of sodium acetate and the corresponding mercuric salts are formed. Hence the titration

with the acid should give the combined value for all the above mentioned groups. The curves for the non-aqueous titration of the isopropanol extract of the fat liquor at different concentrations in presence of mercuric acetate are given in Figure 4. It is seen from the figure that the end points are well-defined and proportional to the concentration. From the titre value obtained thus ($A + B + C$), substracting the corresponding titre value for the sample in glycollic medium due to — $COONa$ (A) alone, the value due to the presence of — OSO_3 Na and — SO_3Na groups ($B + C$) is obtained and expressed as milliequivalents per 10 gm of the sulphated oil.



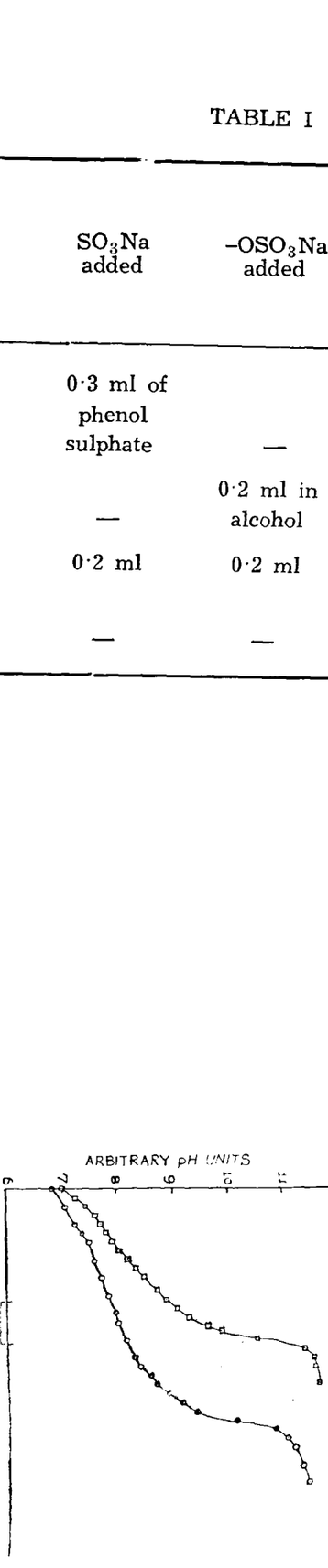
Determination of $-OSO_3Na$ group (B). Since only the combined value due to $-OSO_3Na$ and $-SO_3Na$ ($B+C$) could be evaluated by titration with acid in presence of mercuric acetate the problem still remained how to determine separately $-OSO_3Na$. To do this, a method analogous to the customary chemical method was adopted. The principle employed is the same, i.e. by boiling in acid solution, the $ROSO_3Na$ is readily hydrolysed giving rise to sodium bisulphate whereas the RSO_3Na is not hydrolysed. It is known that sulphuric acid gives two end points in glycol-acetone mixture (1·5 : 1) when titrated with NaOH in G-B mixture,[9] the second end point corresponding stoichiometrically to the titration of $NaHSO_4$. When a mixture of

TABLE I

Sulphated oil taken	SO_3Na added	$-OSO_3Na$ added	$-COONa$ added	Theoretical value	Value found experimentally	Error
				ml of 0·1*N* acid		
1. 0·3 ml of isopropanol extract of sulphated pongam oil ..	0·3 ml of phenol sulphate	—	—	0·54	0·53	–2·0%
2. Do. ..	—	0·2 ml in alcohol	—	0·60	0·615	2·5%
3. Do. ..	0·2 ml	0·2 ml	—	0·74	0·72	–2·7%
4. 0·2 ml of the above solution ..	—	—	0·0038	0·28	0·29	3·3%

In order to confirm whether the methods gave accurate results for $-SO_3Na$, $-OSO_3Na$ and $-COONa$, known amounts of each separately and in mixture were added to the neutralised sulphated oil extracted with isopropanol and the results given in Table 1. It is seen from the table that the added quantity of the salts got titrated within an error of 3-4% thereby proving the validity of the method.

Free fatty acids (E): The fatty acid content of the fat liquor, if any, was found by titration with standard alkali in glycollic or any other suitable medium (Figure 7).



Several of the fat liquors commercially used were analysed by the procedure developed and the results are given in Table II. It is seen from the table that excepting sulphated pongam oil and one other commercial fat liquor, $-SO_3Na$ is also present in all the other commercial fat liquors. One of the samples did not contain any $-OSO_3Na$ group and —COOH group denoting that the fat liquor is of sulphonated mineral oil type. Hence the method gives also an insight into the nature and type of the fat liquor

TABLE II

Fat liquor sample	$-OSO_3Na$	$-SO_3Na$	$-COONa$	Na_2SO_4	free COOH
	eqs. per 10 gm of the sulphated oil as such (Not on dry basis)				
*1. Sulphated Pongam oil ..	1·70	0·15	3·24	3·68	4·23
*2. Sulphated fish oil ..	1·06	0·9	2·49	2·90	6·40
3. Commercial fat liquor 1. ..	2·65	Nil	1·17	6·53	10·88
4. Commercial fat liquor 2. ..	1·06	0·87	1·87	6·72	7·60
5. Commercial fat liquor 3. ..	0·56	1·50	2·18	6·29	4·88
6. Commercial fat liquor 4. ..	Nil	1·15	1·13	2·34	Nil

* The fatliquors prepared at C.L.R.I.

marketed. Standard procedure for the entire titration can be summarised thus:

(1) About 5 gm. of the sulphated oil is weighed exactly and extracted with 40 ml. of 90% isopropanol. The extract is centrifuged (a second time, if necessary, with 5 ml. of isopropanol) and made upto 50 ml. An aliquot, say, 1-2 ml. was titrated with 0·1*N* perchloric acid in dioxan, in glycol-butanol (1 : 1) medium. The end point gives *A* corresponding to $-COONa$ groups.

(2) To another aliquot of the centrifuged extract (1–2 ml.) 5 ml. of saturated mercuric acetate in glacial acetic acid were added and heated at 80°C for one hour. The solution was titrated in glacial acetic acid (15 ml.) and acetic anhydride (10 ml.) with standard $HClO_4$ in dioxan. The titre value gave $A+B+C$ where *B* and *C* are due to $-OSO_3Na$ and $-SO_3Na$ groups respectively.

The difference of 2 and 1 gives $B \sim C$.

(3) To 0·02-0·05 g. of original sulphated oil 5-10 ml. of saturated mercuric acetate were added and the titration

carried out as before. The titre value gave $A+B+C+D$ where *D* is due to Na_2SO_4.

(4) 10-20 ml. of isopropanol extract of sulphated oil were treated with 5-10 ml. of 0·5*N* HCl acid and evaporated over a water bath with some quantity (5 ml.) of added water. The hydrolysed oil was titrated in glycol-acetone mixture (15 ml. : 10 ml.) with 0·25 or 0·5 *N* NaOH in G-B mixture. The end point due to $-OSO_3Na$ group alone (*B*) was evaluated from the difference between the second and first end points.

(5) 1 gm. of the sulphated oil was titrated with 0·2*N* NaOH in G-B medium to give the end point due to $-COOH$ groups (*E*).

The individual groups were computed from the titre values as follows :—

$$1 = A$$
$$4 = B$$
$$(2-1)-4 = C$$
$$(3-2) = D$$
$$5 = E$$

Some observations on the chemical method: In the chemical method of analysis of sulphated oils[1] the soap value is obtained by adding excess of HCl acid and titrating the unreacted acid immediately in the cold to pH 2·8, i.e., the end point obtained with bromophenol blue indicator. If Na_2SO_4 were present in the fat liquor which is usually the case as seen from Table II the sodium sulphate is converted into sodium bisulphate which is not titrated at pH 2·8 and introduces error in the determination of soaps.

The organically combined sulphur due to $-OSO_3Na$ groups is determined by hydrolysis with excess acid and back titration of the same with alkali. The acid corresponding to the soap content is added to the value to correctly arrive at the $-OSO_3Na$ content. Since the presence of

sodium sulphate interferes in the determination of soap, this value indirectly affects the estimation of $-OSO_3Na$ also.

However, the above difficulty was overcome by freeing the fat liquor from sodium sulphate by extraction with isopropanol and following the chemical procedure. The values obtained thus, agreed with the values obtained by nonaqueous titration technique.

Since the determination of $-SO_3Na$ by chemical method is tedious and cumbersome, it is not employed for routine purposes, even in the official method whereas the determination by non-aqueous titration technique gives a measure of the organically combined sulphur due to both $-SO_3Na$ and $-OSO_3Na$ groups present in the sulphated oils.

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RESEARCH BEARS FRUIT

Practical Demonstration No. 1

(Third Series)

Manufacture of Fancy Leather for Leather Goods from Chrome and Vegetable Tanned Splits *

BY

J. C. DEB

Introduction

Using resin binder and pigment, chrome and vegetable tanned splits may be finished in attractive and pleasing colours. Leathers so finished could be used for makng cheap quality leather goods—suit cases, traveller's box, portfolios, zip cases, jewellery cases, camera cases, etc. Such leathers of thickness 0·5 to 2·55 mm. are being regularly used in the leather goods industry. In the United States, some tanneries handle only vegetable and chrome tanned splits and prepare various types of leather intended for leather goods. The qualities required in the finished splits are softness, pliability, strength, non-stretchness, fast colour, non-crackiness on double fold and fastness to light and air. This field is one which can be profitably explored and exploited by the Indian tanner. Two processes in the manufacture of chrome and vegetable tanned splits are described below :

Processing of Chrome Tanned Splits.

Raw Materials:

Chrome tanned splits are assorted and shaved to level substance —0·5 to 2·5 mm. The splits of different thick-

* Process demonstrated during Jan.!Feb. 1959.

ness could be used for different types of leather goods. The shaved weight of the splits is recorded.

Washing and Re-Tanning:

The shaved splits are loaded into a drum with a good amount of float, run for 30 minutes and then left in the drum overnight. Next morning, the float is drained off. 3% of chrome extract powder is dissolved the previous day in 100% of hot water (based on shaved weight of splits). The splits are put into the drum with 200% of water and half the quantity of the chrome liquor previously prepared. The other half of the liquor is added after running the drum for 30 minutes. After drumming for two more hours, basification is effected with 1% soda ash dissolved in small quantity of water. The drum is run for one more hour and the goods are horsed up.

Neutralisation:

The retanned splits are washed in a drum with a good float for 15 minutes and then the wash liquid is drained off. A fresh bath is made up with 300% water by volume to which 2% ammonia and 1% soda ash are added. The drum is run for 45 minutes. Another wash with a good float is given for 15 minutes. The goods are then removed and are ready for pearling and fat-liquoring.

Pearling and Fat-liquoring:

This is carried out with a mixture of:—

Sulphated Fish Oil	:	2½%	(on shaved weight)
T.R.O.	:	2½%	,,
China Clay	:	3%	,,
Flour (cooked in water)	:	2%	,,
Water	:	200%	,,

The splits are put into the drum with a float of 200% water at 50°C and the mixture mentioned above is added in emul-

sion form through the hollow axle into the revolving drum which is then run for two hours. The goods are removed and piled on horse.

Toggling and Drying:

The splits are toggled or nailed on board and dried, completely.

Sawdusting, staking, buffing and drumming:

The dried splits are re-wetted by keeping them in moist saw-dust for two to three hours, staked with heavy pressure, hung up to dry and then buffed first with 80 grit emery paper on both sides and then with 320 grit paper on the split side only. They are then dusted off, trimmed and are ready for finishing.

Processing of Vegetable Tanned Splits.

Raw Materials:

Vegetable tanned splits are assorted and shaved to level substance, 0·5 to 2·5 mm. The shaved weight of the splits is recorded.

Washing and Stripping:

The shaved splits are washed in a drum with a good float for 15 minutes and left in the drum overnight. Next morning, the float is drained out and the stock is ready for stripping. The stripping solution is made in a drum with 2% borax and 300% water, based on shaved weight of the splits. The goods are put into the drum which is then run for 30 minutes. The float is then drained off and the goods are washed wth a good float for 15 minutes and then horsed up to drain.

Chrome Tanning:

6% chrome extract powder is dissolved a day prior, in 100% hot water. The splits are put into the tanning drum with 200% water and half the quantity of the chrome liquor

previously prepared. The other half of the liquor is added after running the drum for 30 mnutes. After a further drumming for three hours, the basifying solution is added to the drum. The basification is done with 1% soda ash dissolved in a small quantity of water. The drum is run for 45 minutes to 60 minutes and then the goods are taken out and horsed.

Neutralisation:

The chrome tanned splits are washed in a drum with good float for 15 minutes and then the bath is drained off. A fresh bath is prepared with 300% water, 2% ammonia and 1% soda ash and the goods are run in this bath for 45 to 60 minutes. This is followed by another wash with good float for 15 minutes. The goods are then removed and are ready for pearling and fat-liquoring. 2½% flour is cooked in a small quantity of water and mixed with 2½% China Clay, 2% sulphated fish oil and 2% T.R.O. The splits are put into a drum with a float of 200% water of 40°C. The above mentioned mixture in emulsion form is then added through the hollow axle into the revolving drum which is run for two hours. The goods are then removed and horsed up. Toggling, saw-dusting, staking, buffing, etc., are carried out, as described in the process for chrome tanned splits.

Finishing:

The following procedure is adopted for both chrome and vegetable tanned splits:—

Black (Baby crocodile design).

Composition of Bottom season:

CLRI Black pigment paste	.. 3 lbs.
CLRI Binder 'A'	.. 8 oz.
Synthetic Resin Emulsion	.. 3 lbs.
Ammonia	.. 2 oz.
T.R.O.	.. 2 oz.
Water to make up to	.. 1 gallon

The above coat is applied twice with pad on the split side and then allowed to dry. The dried splits are then smooth-plated at 150°F. with medium pressure. One pad coat and one spray coat are then applied and the splits allowed to dry.

Fixing Coat:

The fixing coat is of the following composition:—

10% Casein solution	.. 1 part
40% Formaldehyde	.. 1 part
Water	.. 4 parts

The spray coat of the fixing composition is given and then allowed to dry. The splits are then embossed with baby crocodile design, at 100°F with full pressure.

Top Clearing Lacquer Coat:

Composition of the Clearing Lacquer:—

Clear Lacquer	.. 1 part
Thinner	.. 3 parts

One spray coat of the clear lacquer is given to the splits, thereby making them completely fast to dry and wet rubbing.

Measuring and Smooth Plating:

The finished leathers are then measured and smooth plated at 150°F with light pressure. They are then ready for market.

2. *Dark Brown (Baby crocodile design)*:

Composition of the Bottom Season:—

CLRI Tan Pigment Paste	.. 2 lbs.
„ Black „ „	.. 8 oz.
„ Orange „ „	.. 8 oz.
Nap. L. Br. TNS	.. 14 gms.
Nap. red GS.	.. 6 gms.
CLRI Binder 'A'	.. 8 oz.
Ammonia	.. 2 oz.

T.R.O.	
Synthetic resin emulsion	.. 2 oz.
Water to make	.. 3 lbs.
	.. 1 gallon

The procedure is the same as given for finishing black.

3. *Light blue, two-tone shade (seal grain design)*:

Composition of Bottom Season:—

CLRI white pigment paste	.. 2 lbs.
„ blue „ „	.. 10 oz.
„ yellow „ „	.. 1 oz.
Methylene blue	.. 7gms.
CLRI Binder A	.. 6 oz.
Ammonia	.. 1½ oz.
T.R.O.	.. 1½ oz.
Synthetic resin emulsion	.. 2¾ lbs.
Water to make	.. ¾ gallon

Two pad coats of the season are applied on the splits and then allowed to dry. The dried splits are smooth-plated at 150°F with medium pressure. One pad coat and spray coat are then applied and allowed to dry.

Top Colouring Coat:

Composition:

CLRI blue pigment paste	.. 1 lb.
„ black „ „	.. 1 lb.
Water	.. 8 lbs.

A spray coat of the above colour coat is given and then allowed to dry.

Fixing Coat:

Composition:

10% Casein solution	.. 1 part
Formaldehyde (40% strength)	.. 1 part
Water	.. 4 parts

A spray coat of the above is given and allowed to dry. The dried splits are then embossed with seal grain design, at 150°F. with full pressure. The embossed splits are then cleaned by rubbing with a wet cloth pad, which is first dipped in 5% Ammonia solution and the excess solution squeezed out. The two-tone effect is thus produced. The cleaned splits are then dried and given top clearing lacquer coat and then finished as given under black finish.

4. *Red two-tone shade (seal grain design)*:—

Composition of Bottom season:

CLRI red pigment paste	.. 1½ lb.
„ white pigment paste	.. 4 oz.
„ Binder A	.. 2 oz.
Ammonia	.. 1 oz.
T.R.O.	.. 1 oz.
Synthetic resin emulsion	.. 2 lbs.
Water to make	.. 6 lbs.

The rest of the procedure is the same as given under light blue finish except that the top colour coat is of the following composition:—

CLRI black pigment paste	.. 1 lb.
Water	.. 8 lbs.

5. *Yellow two-tone*: Composition of bottom season is given below:—

CLRI white pigment paste	.. 1 lb.
„ yellow pigment paste	.. 1 lb.
„ black pigment paste	.. 5 gms.
„ Binder 'A'	.. 3 oz.
Auromine dye	.. 1 gm.
Ammonia	.. 1½ oz.
T.R.O.	.. 1½ oz.
Synthetic resin emulsion	.. 2¼ lb.
Water to make	.. 7½ lbs.

The procedure is the same as given under light blue with the composition of the top colour coat, modified as follows:—

CLRI yellow pigment paste	.. 1 oz.
„ black „ „	.. 1 oz.
„ white „ „	.. 1 oz.
„ red „ „	.. 2 gms.
Water	.. 2½ gms.

6. *Slate grey two-tone (seal grain)*: Composition of bottom season.

CLRI white pigment paste	.. 1 lb.
„ black „ „	.. 2 oz.

„ yellow „	..	½ oz.
„ Binder A	..	1½ oz.
T.R.O.	..	1 oz.
Ammonia	..	1 oz.
Water to make	..	½ gallon

The procedure is the same as given under light blue with the top colour coat of the following composition: —

CLRI red pigment paste	..	8 oz.
Water	..	2 lbs.

N.B.: Unless specified, the percentages given are based on the shaved weight of the splits.

TECHNICAL SEMINAR

Leather Industry in the Saurashtra and Vidharba Regions of Bombay State *

BY

A. GANESAN

A survey of the Saurashtra and Vidharba regions of the Bombay State was made as a prelude to organising extension service work in these parts. The survey was made in the month of July, 1958. The places visited in the course of this survey tour, were Nagpur, Kamptee, Nalwadi, Rajkot, Chittal, Banwad, Visvadar, Junagadh and Sherbaugh and also Bombay. The Nagpur Tanning School, the Goseva Charmalaya at Nalwadi maintained by Akhila Bharat Seva Sangh, Bandra Tanning Institute, the model tannery at Rajkot, run by the Saurashtra and Village Industries Board and several other tanneries and pinjrapoles were also surveyed.

Raw materials :

Vidharba. The hides available are all dead dried hides, due to prevalence of ban on cow slaughter. Goat skins of this area are inferior to Deccans being coarser and smaller in size. Best goat skins are from Bhusaval. While the hides produced in the Vidharba region are poor, the goat skins of several of the places are better. Sheep in the area are all wool sheep. Summer hides are mostly bad. While some of the areas in this region produce well-cured hides, others do not.

Saurashtra : Here also only bad hides are processed. The Gujarat hides are superior to those from Kathiawar

* Condensed from the talk given on 9-2-1959.

There are a number of pinjrapoles in this area, where in the unproductive cattle are collected and taken care of till they die. The value recovered from the dead animals by way of hide, meat manure, bones, etc., is only a portion of the cost of maintenance of these cattle. So these pinjrapoles have to be subsidised, these subsidies coming from generous donors. These pinjrapoles have flaying centres attached to them. In some places producing centres also are organised and run.

The survey would appear to indicate the need for popularisation of some of the processes worked out at the Institute for use with dead hides. Also the unhairing methods used by the village chamars need thorough scientific study so that they could be improved to give better results.

ABSTRACTS OF PAPERS

Presented at the Symposium
on
"TANNING AS A SMALL-SCALE & COTTAGE-SCALE INDUSTRY"

RAW HIDES & SKINS

INDIAN LIVESTOCK WEALTH. *M. R. Mahajan, Livestock Development Officer, New Delhi.* India possesses an extensive livestock population; this livestock provides motive power for cultivation, drawing water from wells, and transportation. The development of the livestock fundamentally centres round the provision of adequate feeding, rehabilitating simultaneously their productive capacity through improvement of breeding and disease control. It is hoped that in the near future the productive efficiency of the livestock is fully developed.

SOME ASPECTS OF THE INDIAN LEATHER INDUSTRY. *V. B. Desai, Kora Gramodyog Kendra, Borivli, Bombay.* In improving the quality of cattle hides, attention has to be paid not only to improving the quality of the breed but also to nourishing and housing them; also by proper care in flaying and curing, the quality of the hide could be preserved. It is suggested in this connection, that the various organisations and the schemes could be all brought in under a single control thus avoiding duplication of work.

SOME ASPECTS OF COLLECTION AND DISTRIBUTION OF RAW HIDES AND SKINS IN INDIA. *S. C. Nandy, Central Leather Research Institute, Madras.* Some of the problems of collection of raw hides and skins and their distribution to the Indian tanners have been presented. It has been emphasised that the distribution of raw materials should be adjusted according to the need of the country internally and for export trade.

FORMATION OF A CHAIN LINK FOR PROCUREMENT OF RAW HIDES AND DEVELOPMENT OF VILLAGE LEATHER INDUSTRY. *J. C. Amin, Khadi and Village Industries Commission, Bombay.* 80% of the production of Indian leather is by the

unorganised sector. However, incentive to produce better quality leather is not prevalent widely due to lack of demand in villages, for finished products. Further the village flayer does not deal with the genuine buyer and any incentive on his part also is scotched by his pecuniary conditions. The raw hides and skins are produced by the village chamars, and in the pinjrapoles, gosadans and dairies of urban areas. While the pinjrapoles can greatly help in procurement of hides and recovery of carcasses, the Gosadans could prevent breeding of weak cattle. For the development of 80% part of the Industry, scientific study of the traditional methods followed, direct linking of the producers and consumers and utilisation of the bye-products are needed. Reference is made to the work of the Central Leather Research Institute and the Khadi and Village Industries Commission, in this connection.

HIDES AND SKINS AS RAW MATERIALS FOR A COTTAGE INDUSTRY. *R. Bhaskaran, Central Leather Research Institute, Madras.* Some problems connected with the collection and preservation of hides and skins are described, with some suggestions for improvement, with a view to improving the quality of the raw materials.

HOW TO PREPARE BETTER HIDES AND SKINS. *Ernest Taussig, F.A.O. Hides and Skins Expert, Philippines.* In Philippines, a large majority of hides and skins are produced in small slaughter houses and by individual owners, who are urgently in need of instruction in improved methods of hides and skin flaying and preparation. The improvements in every stage — slaughter, bleeding, flaying (using hoist), curing (drysalting), drying and wet salting — are described.

MODERN METHODS FOR THE CONTROL OF TICKS AND WARBLE FLIES. *D. N. Nakhate, Chika Private Ltd., Bombay.* Two recent veterinary preparations of Bayer-Neguvon and Asuntol, have been tried with success in different countries for control of ticks and warble flies. In view of the fact that great stress is now being laid in this country on improvement of hides and skins, these methods of controlling ticks and warble flies would prove useful in trials on a country-wide scale.

SOME SUGGESTIONS FOR THE PREVENTION OF INSECT DAMAGE TO HIDES AND SKINS. *R. Bhaskaran and S. N. Sen, Central Leather Research Institute, Madras.* Dieldrin

dust and ethylene dibromide have been tried in preventing insect damage to hides and skins. The former was found in 1½, 1 and ½ per cent concentrations to be quite toxic to the adult as well as larval forms of *Dermestes maculatus*. *Attagenus gloriosae* and *Anthrenus vorax* larvae were comparatively more resistant to the action of this insecticide. Ethylene dibromide proved to be an effective fumigant for the control of these pests.

SOME NOTES ON THE MORE COMMON DEFECTS IN EAST AFRICAN HIDES AND SKINS. *R. J. Welch, East African Hides and Skins and Leather Bureau, Nairobi.* East African hides and skins suffer from flaying damage, branding damage, sores and disease damage, putrefaction damage, insect damage and corduroying damage. The various steps that are being taken through the East African Hide Improvement Services have been detailed. The corduroying damage is a comparatively new type of damage recently noticed in vegetable tanned leathers only. The damage is probably caused by the connective tissues joining the back and side muscles to the hide.

PROCESSES & TREATMENT MATERIALS

SOME TRADITIONAL PROCESSES OF LEATHER MANUFACTURE IN WESTERN REGION. *A. S. Naik, Small Industries Service Institute, Bombay.* Traditional processes for bag tanning of sole leather, vegetable tanning of hides and skins in Cutch, and leather finishing are described. These processes are peculiar in economy and simplicity.

BAG TANNING AS COTTAGE TANNING INDUSTRY IN THE MAHARASHTRA REGION. *K. V. Sant and M. V. Sathe, Department of Cottage Industries and Industrial Co-operatives, Bombay State, Poona.* Bag tanned leather is produced at Kolapur, Satara, and Poona in the Maharashtra region. The stages in this process are soaking, liming, fleshing, scudding, deliming, first tanning with a mixture of *babul* and *hirda* followed by bag tanning, and drying. Though partly undertanned, this kind of sole leather finds favour in the market, on account of certain advantages. The Bombay State Government has introduced retanning and rolling the bag tanned leather. It is urged that the Government should encourage production of this retanned and rolled leather produced by the cottage units.

SOME PRIMITIVE PROCESSES OF LIGHT LEATHER TANNAGE AS FOLLOWED BY THE TRADITIONAL TAN-

NERS. *Small Industries Service Institute, New Delhi.* Two indigenous methods of vegetable tanning sheep skins, (1) the so-called flour tanning method and (2) the method for *Nari* leather (vegetable tanned goat skins dyed with lac) and a method for alum tannage of sheep skins for shuttle-cock leather are described. In the first method, depilation is effected by means of flour and *Ak;* tanning is with *babul.* In the second method, conventional liming and deliming, is carried out after which follows a flour bath treatment. Before tanning, the goods are dyed with lac. Tanning is with *babul.* The essential features of the third method are liming, drenching with *Satu* liquor, brining with khari salt, and then aluming with a mixture of curd and alum.

BRIEF DETAILS OF THE WORKING OF THE TRADITIONAL TANNERIES IN THE NORTHERN REGION. *Small Industries Service Institute, New Delhi.* Tanners in the Northern region fall into two groups, *Khatiks* and *Chamars.* The former do mostly light leather tanning, the latter bag tanning. The salient features of the practices followed by these two types of tanners are sketched.

DRY TANNAGE FOR SOLE LEATHER. *P. S. Kumar, Department of Cottage Industries and Industrial Cooperatives, Poona.* Dry tannage for sole leather adopting the conventional pit tannage and drumming with chestnut powder extract in the last stage, is described. It is recommended that this process will improve the quality of leather which is produced with inferior quality raw hides from dead animals.

PRODUCTION OF COLOURED VEGETABLE TANNED KATTAIS. *J. Ghosh, Small Industries Service Institute, Madras.* Two processes for production of coloured vegetable tanned *kattais* have been suggested in this paper, one from E. I. tanned rejected kattais and the other from the raw stage. Both of these processes have been tried and found suitable for adopting in the small scale industries with advantage.

RAPID TANNING OF SOLE LEATHER. *H. S. Jadhav, Leather Finishing Centre, Erode.* A process for rapid tanning of sole leather is described. The total time required in this process is 28 days. The main advantages of the process are as follows: No machinery except a rolling machine is needed; cracking of the grain is prevented. The leather produced is strong and firm and the yield is not less than 60%.

COTTAGE-SCALE TANNING OF SHEEP SKINS. *D. Woodroffe, Northampton.* Cottage-scale tanning of sheep skins is described in this paper. The author deals with processes as practised in India as well as those outside. While unhairing has been mainly by 'sweating', chemical unhairing agents are now slowly superseding them. Similarly, degreasing with chemicals is now resorted to. It is with regard to tanning that the author has got valuable suggestions to make. A gradual replacement of the tanning barks by extract mixtures is advocated. The possibilities presented are (1) substitution of a part of the *avaram* bark used, by *goran* bark, and then bleaching with myrobalans, (2) use of a mixed tan liquor prepared from *goran* and bleached mimosa, and (3) use of mimosa bark alone with a subsequent bleaching with myrobalans or use of bleached mimosa extract.

PROPOSED IMPROVEMENTS IN THE TANNAGE OF E. I. LEATHERS. *R. L. W. Inkster, Forestal Land, Timber & Railways Co., Ltd., U.K.* The E. I. tanned leather industry is considered as the cottage industry, most urgently requiring modernisation, if it is to survive as an export trade, under present-day competitive conditions. The processing modifications suggested are stated to be quite suitable in the production of E.I. leathers, giving a product with the same characteristics and chemical analysis as of those at present produced. The more important modifications suggested are: use of paddles and lattice drums in soaking, shortening of the liming period by using a 3-pit method or alternatively a 6-pit system, use of acids for deliming and bates for bating, halving the tanning time by using a series of 6-7 tanning pits with graduated strengths, blending of avaram liquor with decolourised wattle extract powder, etc. It might not be advisable, however, to depart too abruptly from the established methods.

AVAL IN SAURASHTRA — A PROBLEM. *Dhinoobhai Mankad, Saurashtra Khadi and Village Industries Board.* The tanning industry in Saurashtra is chiefly in the hands of village tanner. The tanning is carried out using *aval* bark. However, there is in the State an acute shortage of this bark due to indiscriminate felling of trees for use as fuel. Urgent action by Government authorities is needed for setting right the situation.

A SURVEY OF SOME IMPORTANT TANNIN MATERIALS FROM INDIA, SPECIALLY COMMON IN WESTERN INDIA. *G. S. Puri, and M. Y. Ansari, Botanical Survey of India, Poona.* The Western circle of the Botanical Survey of India has been

carrying on botanical explorations and survey work in this region and has collected a large number of plant specimens of both medicinal and economic importance. A list of forty tanniferous plants from various parts of India, particularly from Western India, is given along with their distribution and uses.

CUTCH AS A POTENTIAL TANNING AGENT IN SMALL SCALE AND COTTAGE INDUSTRY. *S. Sadgopal, Deputy Director (Chemicals), Indian Standards Institution, New Delhi.* Cutch, the by-product of small scale and cottage manufacture of *Kattha,* is at present going to waste to the extent of one crore of rupees. The tan content of this material renders it a potential indigenous source of tan stuff. Its complete recovery by the economical improvements introduced by the author, chemical analysis, exploratory experiments carried out at the C.L.R.I. for its use in the manufacture of sole leather and E.I. tanned kip, are dealt with and the comparative utility of this material discussed. The need for harnessing the useful results of researches by further intensive work and co-operative organisation has been stressed.

MARKETING

IMPORTS INTO CANADA OF HIDES & SKINS, LEATHER AND ITS MANUFACTURES. *W. J. Collett, Acting Trade Commissioner, Canadian Government Trade Commission, Bombay.* The statistics for 1957 and January-June 1958, of Imports into Canada of hides & skins, leather and its manufactures are given.

WHY PRODUCTIVITY IN THE LEATHER INDUSTRY? *Sanjoy Sen, The National Tannery Co. Ltd., Calcutta.* Productivity is defined as the ratio between the output of wealth produced and the input of resources used up in the process of production. The Indian tanning trade could increase its productivity by improving the lighting conditions prevailing in their tanneries, by improving the working conditions prevailing in the tanneries, by paying greater attention to a proper lay out, plant and machinery following the process flow, by improving techniques and cutting on operations by means of development and research, by proper methods of material handling, by quality control and inspection at all stages of the tanning process and by job evaluation and better employer and employee relations.

OPERATIONAL RESEARCH FOR DEVELOPING COTTAGE TANNING INDUSTRY. *M. S. Rao, J. B. Research Institute, Wardha.* The paper deals with the application of methods

of operational research for a planned improvement or development of the decentralised or cottage sector of the tanning industry under technical assistance and financial aid. The nature of operational research in the tanning industry is explained with reference to a queueing problem and a problem of the optimum allocation of limited resources or linear programming. The allocation problem is shown to be the central problem of developing the cottage sector under limitations of the scale of production, capital resources and technical know-how. A model of the decentralised industry in which the technological, economic and social (or employment) factors are integrated is drawn to explain that the most effective method of increasing productivity under the limitations of scale and capital is to introduce on a priority basis such improvements in the process and equipment indicated by applied scientific and technological research that will increase the income-coefficient of capital without raising in the same proportion the capital coefficient of employment. Operational research furnishes the only scientific methods available at present for developing the cottage sector under technical assistance and economic aid in Five Year Plans.

HIDES AND SKINS' TRADE IN INDIA. *R. A. Bhote, Directorate of Marketing and Inspection, Nagpur.* The hides and skins' trade suffers an annual loss of four million rupees due to wastage in collection, about nine million rupees due to defective flaying and even a greater loss due to defective curing. These losses could be minimised by introduction of more carcass utilisation centres, training of professional flayers, and such other means. By enforcing quality control schemes, the standard of the exported goods could be raised. Direct contact with the buyers in foreign countries would then be possible, eliminating intermediaries. These measures would earn more foreign exchange.

SOME VIEWS ON MARKETING OF INDIAN HIDES. *F. H. Hoek, FAO/ETAP, Adviser, Ministry of Food & Agriculture, Government of India.* The most important source of supply of raw hides is from fallen animals i.e. from those dying from accident, hunger, disease, old age and exposure. The take off and the curing of these hides are not always carefully done. However, training in the correct methods of flaying and curing alone cannot remedy the defect. Hide developing activities should be preferably accompanied by introduction of such marketing practices as will assure the primary producers their fair share of the value

PROBLEMS OF A SMALL TANNER IN BOMBAY STATE AND VARIOUS TRADE PRACTICES. *W. N. Pandav, Department of Cottage Industries and Industrial Co-operatives, (Bombay State), Poona.* Men, Material, Money, Means of Transport, Management, Machinery and Market are the factors which play an important part in any industry. The conditions of the cottage tanning industry in the Bombay State, in regard to these factors are analysed.

PROBLEMS OF COTTAGE TANNERS. *A. R. Swaminathan, Assistant Director of Industries (Leather), Patna.* Organisation of cottage tanners into cooperatives and financial assistance are not sufficient in developing them. Because of the control of the raw materials market by beoparies and agents procurement of these at reasonable prices is difficult. Setting up of flaying centres is the answer to this. The use of local tanstuffs has to be encouraged. The Research Institutes could help by evolving simple processes for application by bag tanners and also a simplified type of rolling machine.

COTTAGE TANNING INDUSTRY NEEDS GOVERNMENT HELP FOR ITS DEVELOPMENT. *S. M. Mazumdar, Banaras.* The various types of leathers produced by the cottage tanning industry are mentioned; the role of some of these in earning foreign exchange is brought out. The need for Government help in developing the cottage tanning industry on the lines of the Handloom Industry is stressed.

COTTAGE TANNING INDUSTRY IN BOMBAY STATE: ORGANISATION, FINANCE & MARKETING FACILITIES. *C. V. Gangal, Tanning & Leather Expert, Cottage Industries and Industrial Co-operatives (Bombay State) Poona.* The cottage tanning part of the Indian Leather Industry, has no bright future unless the artisans form themselves into co-operative societies. For establishment of these, financial and technical assistance from the Government is needed. About 20 members can form a small co-operative society, the District and the State Industrial Co-operative Associations being built up from these primary units. Formation of these societies facilitates collective procurement of raw materials and also collective marketing. While the Government would give only the minimum share capital for these the share capital can be built up from the transactions of the individual members. The working of the societies in the Bombay State is described.

COTTAGE TANNING INDUSTRY IN THE GUJARAT REGION: IMPROVEMENTS IN COUNTRY TANNED LEATHER. *V. S. Kotwal, Department of Cottage Industries and Industrial Co-operatives, Bombay State, Poona.* In the Gujarat region vegetable tanning is being done without the regular soaking, liming, deliming, etc. The hides and skins are soaked for about two months in *Jawasu* leaves, and then for about a month in the bath of *Turwad* bark and *Hirda*. With the organisation of peripatetic schools at some important centres, modern process is now being followed. If this is to be further popularised it will be necessary to organise two more such centres.

TANNING AS A SMALL-SCALE INDUSTRY. *P. K. Patnaik, Community Project Officer, Bhanjanagar.* The village leather industry, one of the oldest industries in the country, declined due to the establishment of big factories. For improving the village leather industry, several steps have to be taken starting from flaying itself. Co-operative societies of flayers could be organised in groups of villages, thus eliminating middlemen; improved processes of flaying could be taught. To make these co-operative societies self-supporting, bone crushing units have to be attached. In order that the village tanner could work economically, they should have each a minimum capacity of 200 hides per month. Better arrangements for marketing village tanned leathers may be organised by linking the village tanneries with large-scale ones.

TANNING AS A SMALL-SCALE AND COTTAGE INDUSTRY. *N. R. Sarkar, Bata Shoe Co., Private Ltd., Batanagar.* The major portion of the leather industry in the country is at the cottage level. The chief difficulties facing this part of the industry are old methods, unfavourable economic conditions, and want of proper roadways and transport facilities. While the large scale part can easily adopt the modern techniques, it is necessary that the relevant technical knowledge should be imparted to the small scale sector. Chrome uppers also can be manufactured at the small and cottage scale level without much difficulty.

COTTAGE TANNING INDUSTRY IN AFGHANISTAN. *N. Subramanian, Ex. I.L.O. Expert.* Tanning Industry in Afghanitan is chiefly a cottage industry. These cottage units process cow, buffalo and camel hides with indigenous tanning materials like pomegranate shells or rinds, apricot roots, *barak* leaves, *thoran* roots, etc., by pit tanning, vat tanning and bag-tanning. Sheep

of better prepared fallen hides. The present rigid tie up with *beoparies* is not favourable for production of better flayed and cured hides.

PROSPECTS FOR MARKETING OF EAST INDIA TANNED LEATHER IN JAPAN. *S. Aoki, Japan.* Japan imports E.I. tanned sheep skins for being used in manufacture of leathers intended for gloves and garments, book binding and gas meter diaphragms. The E.I. tanned sheep skin is the most ideal material for the last mentioned use. There appear to be better prospects in expanding this trade; the 15% import duty however makes the prices at times prohibitive.

BY-PRODUCTS

SOME THOUGHTS ON VILLAGE UPLIFT BY SALVAGING WEALTH FROM WASTE. *P. G. Desai, V. A. P. Corporation Private Ltd., Bombay.* The ways and means for recovering wealth from certain wastes for the uplift of villages have been discussed with particular reference to utilisation of carcass, collection of hides from fallen animals and production of bone meal using bone digester. The advantages of setting up small Gas Plants in villages have also been traced.

BY-PRODUCTS OF FLAYING AND TANNING CENTRES IN COTTAGE INDUSTRY. *P. A. Rao, J. B. Research Institute, Wardha.* The paper describes the methods of recovery of bone and glue from dead cattle in flaying centres as developed at the J. B. Central Research Institute for Village Industries and their economic aspects. The preparation of purified and sterile bone meal suitable for incorporation into Mineral Feed Supplement for cattle is described. An alternate method of calcining the bones in a kiln is given. The higher economy of the processes is indicated. The recovery of glue from bone, hide and fleshings in pilot plant, consisting of simple equipment without the use of refrigerator or ice suitable for cottage production is described.

PROSPECTS FOR BONE CRUSHING ON SMALL AND COTTAGE SCALE. *P. R. Sondhi, Kapurthala Northern India Tanneries Ltd., Kapurthala.* 40% of the bone and almost the entire meat of the fallen cattle is at present going to waste—a waste which could be prevented. The bone crushing industry is at present confined to either large units mainly run by foreign interests or small units sponsored by the Government. Since elaborate machinery and power is necessary, these small units

do not function properly. A most suitable structure for developing this industry would be to have units taking care of carcasses within a radius of hundred miles. Reduced Railway freights for crushed bones, making available transport for carrying of carcasses and propaganda for popularising bone and meat meals as fertilisers are necessary.

TANNING INDUSTRY AND ITS BY-PRODUCTS. *N. Nazir Ahmed, Hon. Secretary, Southern India Wool & Goat Hair Exporters' Association, Madras.* The wool and tannery limed goat hair are the chief by-products of the Indian tanning industry. More than half of the wool produced in the country is exported, the rest being used in the country. Only a negligible percentage of tannery limed goat hair is utilised in this country. India is the only producer of this type of goat hair and so there is a very great and bright future for this by-product with co-operation and encouragement of the Government.

GENERAL

TANNING AS A SMALL-SCALE & COTTAGE INDUSTRY. *T. Jiyyar Das, Akhil Bharatiya Charmodyogi Sangh.* The history, importance and scope of tanning as a small scale and cottage industry have been traced. The problems of proper flaying, collection, preservation and transportation of raw hides and skins have also been discussed.

HISTORICAL SURVEY OF THE INDIAN LEATHER INDUSTRY AND VILLAGE TANNERS' QUESTIONS TO THE LEATHER TECHNOLOGISTS. *G. R. Valunjikar, Khadi & Village Industries Commission, Bombay.* A history of the development of Leather Industry in general and of the Indian Leather Industry in particular is given. Village tanners in different parts of India follow different processes and prepare varied types of leathers using the same raw materials. The scientific knowledge of the Indian leather technologist has not been useful to these village tanners as the materials and equipments suggested by him are not in the easy reach of the village tanners. Hence, a plea is made to the modern Indian leather technologist to come down to the level of the Indian village tanner and first study the processes followed, the materials used, and the surroundings in which he is working, and then suggest suitable modifications to achieve better results.

and goat skins are tanned to a very little extent. Details about the livestock, procurement of hides and skins, curing and the tanning practices are described.

PICKER INDUSTRY IN INDIA. *I. M. Mansuri, Graduate Picker Works, Ahmedabad.* A brief account of the origin, development and the present status of the Picker Industry in India has been presented by the author.

ROLE OF LEATHER INDUSTRY IN SOLVING UNEMPLOYMENT PROBLEM IN VILLAGES. *S. M. De, Central Leather Research Institute, Madras.* India's economy is still mainly dependent on agriculture and it is suggested that those agriculturists who are without work during the off season may take to tanning and leather goods making so as to earn some money and also to meet the demand for workers in these trades.

FOOTWEAR AND LEATHER GOODS INDUSTRIES OF U. P. IN THE SMALL AND COTTAGE SECTORS. *K. L. Muir and G. R. Choudhury, Government Leather Institute, Kanpur.* Uttar Pradesh has, amongst the Indian States, the highest livestock population and also the major part of the country's footwear production is from a number of small and cottage scale units. U.P. has the chief centres of footwear production. There is good scope for utilising the full capacity of the existing footwear production units of the cottage and small sectors in U.P. provided, the difficulties encountered by the manufacturers are eliminated and proper marketing facilities are offered. The financial difficulties experienced are not so much due to lack of funds but owing to ignorance of the facilities offered by the Government. These facilities are also dealt with.

NOTES & NEWS

INDIAN SCIENCE CONGRESS — 46TH SESSION

The Fortysixth Session of the Indian Science Congress was held from the 21st to 28th January, 1959 in the Delhi University Campus. Dr. A. Lakshmanaswamy Mudaliar was the President for this year's Session.

Dr. V. K. R. V. Rao, Vice-Chancellor, University of Delhi, and Chairman, Reception Committee, welcomed the gathering which included eminent scientists from several foreign countries.

Inaugurating the Session, Shri Jawaharlal Nehru, the Prime Minister of India, said that man in his efforts at conquest of space was forgetting his normal life in this planet. He expressed the hope that the further achievements of science would be utilised mainly for useful and peaceful purposes.

In his presidential address, Dr. A. Lakshmanaswamy Mudaliar, Vice-Chancellor of University of Madras, made a rapid survey of the scientific advancement in the twentieth century and illustrated how in no other field of science could the constructive use of the scientific discoveries be more clearly demonstrated than in the field of medical science. Actually, the urgency for certain definite discoveries during the war led to greater scientific effort in preventive and palliative medicine than had been possible during any period of science. He concluded by expressing the hope that the protests of the scientists against abuse of scientific discoveries for destructive purposes would have the desired effect.

The foreign scientist delegates were from a number of countries including U.K., U.S.A., U.S.S.R., Japan and Ceylon. Prince Philip, the Duke of Edinburgh, led the delegation from U.K. An honorary degree of Doctor of Science of the University of Delhi was conferred upon the Prince, at a special convocation held on the 22nd January, 1959.

The Session split into various sections on the 22nd when the presidential addresses were delivered for the different sections. The address for the Chemistry Section 'From simple Molecules

to High Polymers' was by Prof. S. R. Palit, Professor of Physical Chemistry, Indian Association for Cultivation of Science, Calcutta. Prof. Palit surveyed the advances made in the study of polymerisation processes. The Sectional Committee meetings were held on the forenoons of 23rd, 24th, 25th and 27th January, 1959. Nearly 500 papers belonging to the different sections of chemistry were submitted this year.

The following papers were submitted from the Central Leather Research Institute at the Science Congress :

(1) Studies on reactive groups of collagen : Methylation and Guanidination — K. Thomas Joseph and S. M. Bose.

(2) The effect of lyotropic salts on the Shrinkage temperature of tanned collagen — S. Ghosh.

(3) The Iso-electric point of oil tanned leathers and the mechanism of oil tanning — S. Ghosh and Y. Nayudamma.

(4) Determination of cationic surface active agents in mixtures by non aqueous titration technique — D. Ramaswamy and Y. Nayudamma.

(5) A new Hide Preservative, Part I : S. C. Nandy and S. N. Sen.

In the series of the special lectures by foreign scientists, was one by Prof. A. Tiselius of Upsala University, Sweden, Nobel Laureate and Vice-President, Nobel Foundation, on 'Analysis of macro molecular systems in biochemistry'. In this lecture, Prof. Tiselius dealt with various physical methods of separation that were coming into vogue — the different techniques of electrophoresis including the free-zone electrophoresis wherein the tube was continuously rotated, chromatographic techniques utilising calcium phosphate as the adsorbent, methods effecting 'sieving' of molecules through a swollen gel column and partition technique.

Another lecture in the series was that of Dr. E. W. R. Steacie on the reactivity of free radicals. Dr. Steacie dealt with some of the techniques for studying photochemical reactions involving free radicals. He pointed out how differentiation of primary, secondary and tertiary hydrogen atoms, was effective in bringing about good correlation of the observed Arrhenius parameters.

Amongst the popular lectures arranged on the occasion were "The Nobel Foundation and its activities" by Prof. A. Tiselius and 'Atomic Power' by Prof. H. J. Bhabha.

On the 20th January, 1959, the Society of Biological Chemists (India), organised a Symposium on 'Proteins'. The papers presented herein dealt with methods in protein research, protein metabolism and proteins in nutrition and medicine, After the Symposium, Prof. D. K. Bannerjee of the Indian Institute of Science, Bangalore, spoke on Stereo-specific synthesis of steriods. Prof. Bannerjee dealt *inter alia* with synthesis of certain tri-cyclic and anthran derivatives. After this lecture Prof. A. Tiselius spoke on 'Some recent investigations carried out at the Upsala University' which included the application of zone electrophoresis methods to the study of blood serum and ceratoplasmin and intermedin and study of the role of metals like magnesium and zinc in fixation of enzyme on substrates (using electron spin resonance method).

HIS ROYAL HIGHNESS PRINCE PHILIP, THE DUKE OF EDINBURGH, VISITS THE CENTRAL LEATHER RESEARCH INSTITUTE

His Royal Highness Prince Philip, the Duke of Edinburgh, visited the Central Leather Research Institute on the 31st January, 1959. He drove straight from the Airport to the Institute accompanied by Shri Bishnuram Medhi, Governor of Madras and Prof. M. S. Thacker.

On arrival at the Institute, the Duke was received and garlanded by Dr. Y. Nayudamma, Director of the Institute. The Director then took the distinguished visitor round an Exhibition of tanned and finished leathers arranged in the Tannery Building and explained to him the research work done at the Institute. The Duke was presented with a beautiful leather letter-pad covered with a design of a damsel writing a love letter and a lotus-bud shaped leather cushion cover on which was embossed a representation of the shore temple at Mahabalipuram, and a lightly perfumed boquet made of leather waste. The Director then introduced to the Duke, Mr. M. J. Jamal Moideen, Mr. A. J. Sharman, Mr. A. Nagappa Chettiar and Rajah Sir Muthiah Chettiar, Members of the Executive Council of the Institute.

The Royal visitor next went round the Tannery and was shown the several stages in the processing and finishing of leather. Coming out of the Tannery, the Duke met the members of the Staff of the Institute, who greeted him with three cheers. After signing in the Visitors' Book, the Duke left for the University Buildings.

IMPLEMENTATION OF INDIAN STANDARDS
ISI REPORTS INCREASE IN ADOPTION

Voluntary implementation of Indian Standards by manufacturers and consumers has shown a marked progress, as reported by the Indian Standards Institution in its Eleventh Annual Report, for the year 1957-58. The total adoptions number 883 against 970 printed standards, while during the year 171 Indian Standards were formally adopted by the purchasing organizations of the Government as a basis for placing orders.

There was a growing appreciation for the role of standards in developing the economy and industry of the country. The Institution received during the last year as many as 198 proposals for formulating new Indian Standards.

The total number of published standards, with the publication of 160 new and revised standards during the year, increased from 919 to 1079. With the increasing tempo of activities, the number of technical committees, engaged on the task of formulation of standards, went up from 661 to 708, raising the total committee membership to 8196.

The fact that the Institution's subscribing membership rose from 1347 to 1510, and that the sale of Indian Standards touched the record income of Rs. 4.5 lakhs, shows that the country was becoming increasingly aware and appreciative of the good work being done by the ISI in the field of standardization.

Certification Marking

The Institution has been authorised to issue licences under an Act of the Parliament [ISI (Certification Marks) Act, 1952], to manufacturers for stamping their products with the ISI Certification Mark, certifying that the marked goods conform to the relevant Indian Standard, and conveying to the consumer a sort of a third-party guarantee of the quality of goods he is purchasing. It has been experienced that this promotes not only consumer satisfaction but also the export trade.

Certification Marking made further progress during the third year of its operation; the number of licences granted being 75 as against 26 during the previous year, and covering the following 9 articles :

Gum Spirit of Turpentine (Oil of Turpentine); Plywood Panels Tea-Chest; Rectified Spirit Grade B; Naphthalene; Pruning Knives, Hooked and Curved; Copper Sulphate, Technical; Denatured Spirit; Enamelled High-Conductivity Annealed Round Copper Wire (Oleo-Resinous Enamel); Threephase Induction Motors for Industrial Use.

Enquiries received by the Institution show that there is a general desire on the part of manufacturers to have some control over the quality of production and they are anxious to get licences for the use of ISI Certification Mark. In all 140 firms made enquiries about the mark and many ultimately sent their applications for the grant of licences.

SPECIFICATION FOR UREA, TECHNICAL AND PURE
AN INDIAN STANDARD DRAFTED

The Indian Standards Institution has issued a draft Indian Standard Specification for Urea, Technical and Pure [Doc : CDS 24 (893)], which prescribes the requirements and the methods of test for urea, technical and pure.

The use of urea as an agricultural fertilizer as well as for the manufacture of urea — formaldehyde plastics in India is rapidly increasing. Its use as a foliage spray for plants, as a source of protein to feed animals and in various industries such as, the glue and adhesives, textiles, and pharmaceuticals is still to be developed in India. It has been found that urea is an excellent fertilizer for paddy, tobacco, tomato, corn, etc., either in the pure form or in the form of mixed fertilizers. Its high nitrogen content in the organic form, its rapid action on soils with no harmful residual effects and its unleachability with water from soils make it a cheap and excellent nitrogenous fertilizer. Although the major use of urea will be as an agricultural fertilizer, this standard has been formulated laying down the requirements for both technical grade as well as the pure grade.

In laying down the standard due consideration has been given to the product to be made at Sindri as well as the proposed grades to be manufactured at Neyveli. Also in formulating the standard all available analyses of imported urea from several overseas countries have also been taken into consideration.

Copies of the draft standard are available, free on request, from the offices of the Indian Standards Institution, located at New Delhi, Bombay, Calcutta and Madras.

to his choice as approved by the Council, in addition to the General Chemistry including Organic, Inorganic, Physical and Applied Analytical Chemistry—(1) Analysis of Minerals, Silicates, Ores and Alloys; (2) Analysis of Drugs and Pharmaceuticals; (3) Analysis of Foods; (4) Analysis of Water and Sewage; (5) Biochemical Analysis; (6) Analysis of Oils, Fats and Soaps; (7) Fuel and Gas Analysis; (8) Analysis of Soils and Fertilisers; (9) Analysis connected with Forensic Chemistry; and (10) Analysis connected with Leather Chemistry. The Examination is recognised by the Government of India as equivalent to M.Sc., for purposes of recruitment of Chemists.

Further enquiries may be made to the Honorary Secretaries, Institution of Chemists (India), Chemical Department, Medical College, Calcutta-12.

RESEARCH BEARS FRUIT

Practical Demonstration No. 3

(Third Series)

Process:	Retanning and Finishing of E. I. tanned skins for clothing and jerkin leathers.
Period:	23rd March to 6th April 1959.
Place:	Central Leather Research Institute, Madrs-20.

A process for Retanning and Finishing of E.I. tanned skins for clothing and jerkin leather has been worked out at this Institute. It is proposed to demonstrate this process as the next in the Third Series of Practical Demonstrations from 23rd March 1959.

If you are interested in this line of work, you are most welcome to send your representative/s to get trained in the manufacture of this type of leathers. You may kindly intimate the name/s of the representative/s who is/are likely to attend this demonstration. After following the process, we would request you to try this process in your Tannery and give us your valuable comments.

Future Programme :

April : Manufacture of Kattai and Banwar Leather from Buffalo calf.

May : An improved method in chrome upper leather manufacture.

June : Manufacture of crushed and shrunken grain kid.

July : Manufacture of Football leather in plain and coloured finish.

August : Manufacture of chamois leather from Indian fish oil and C.L.R.I. sulphonated oil.

C. L. R. I. NEWS

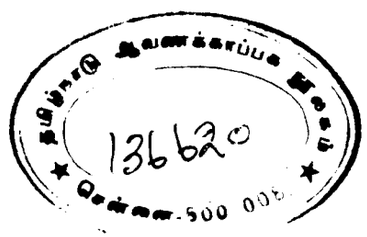
Dr. Y. Nayudamma, Dr. V. S. Padmanabhan and Mr. K. Thomas Joseph, attended the 46th Session of the Indian Science Congress at Delhi held between 21st and 28th January, '59.

Dr. Y. Nayudamma, Director, has been nominated as member of the Sub-Committee for Trade Delegation to Foreign countries, set up by the Leather Export Promotion Council, Madras.

Mr. Ney, Economic Expert for the National Council of Applied Economic Research, New Delhi, visited the Institute on the 10th January, 1959.

The following Junior Scientific Assistants have been promoted as Senior Scientific Assistants.

Shri K. T. Joseph
„ S. K. Sarkar
„ K. S. Jayaraman
„ T. K. Parthasarathy
„ T. S. Krishnan
„ K. Seshaganapathy Rao



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.

SPECIFICATION FOR RUBBER PRODUCTS RAW MATERIALS

FOUR INDIAN STANDARDS DRAFTED

The Indian Standards Institution has issued for comments the following four draft Indian Standard Specifications pertaining to rubber products and their raw materials :

(1) Barytes for Rubber Industry [Doc: CDC 6 (565)], which prescribes the requirements and methods of sampling and test for Barytes, intended for use in Rubber Industry.
Barytes is widely used in the rubber industry as a filler. Rubber manufacturers, since a long time, have been experiencing difficulty in procuring suitable quality of raw materials for want of any national standards. This standard has been formulated with a view to facilitating and assuring a supply of a standard quality of barytes to the rubber industry.

(2) Natural Red Oxides of Iron for Rubber Industry [Doc : CDC 6 (566)], which prescribes the requirements and the methods of sampling and test for natural red oxides of iron intended for use in the Rubber Industry. The standard is expected to facilitate and assure the supply of standard quality of natural red oxides of iron to the rubber industry.

(3) Whiting for Rubber Industry [Doc: CDC 6(567)]. The standard prescribes the requirements and the methods of sampling and test for whiting intended for use in the Rubber Industry.

(4) Latex Foam Products [Doc: CDC 6 (891]. The standard prescribes general requirements and methods of test for those cellular rubber products, known as latex foam rubbers, manufactured from liquid latex rubber either natural, reclaimed or synthetic, alone or in combination, suitably compounded.

Copies of the draft standards are obtainable, on request, from the offices of the Indian Standards Institution, located at New Delhi, Bombay, Calcutta and Madras. The last date for the receipt of comments for the first three draft standards is *4 April 1959* and for the fourth draft standard *6 April 1959*.

METHODS FOR GRADING & CLASSIFICATION OF MUSCOVITE MICA BLOCKS

The Indian Standards Institution has published an Indian Standard Method for Grading and Classification of Muscovite Mica Blocks, Thins and Films (IS: 1175-1957), which describes a standard system of grading and classifying muscovite mica blocks, thins and films according to size, visual qualities, and presence of structural imperfections.

For many years, Indian mica producers have been using a particular system of size-grading and classification of muscovite mica. The Indian system has been adopted by various other countries, such as the U.S.A., Canada, Brazil, South Africa, etc., and has been generally used in international trade. In order that this system may attain the status of a formally recognized International Standard, the Indian Delegation at the Conference of the United Nations' Standards Co-ordinating Committee held in London in 1946, which was the forerunner of present International Organization for Standardization (ISO), took initiative to include mica on the programme of ISO, and accepted the responsibility of the Secretariat for the Technical Committee set up to deal with mica. This Committee, known as ISO/TC 56 — Mica, is now constituted with the UK, USA, USSR, France, Australia, Czechoslovakia, Brazil and India as the Participating Members.

In 1949, ISI published two tentative Indian Standards, namely, IS : 13-1949 and IS : 14-1949 and in its capacity as the Secretariat submitted them as draft proposals to ISO/TC 56 — Mica. After several years of discussion, the International Committee succeeded in preparing, after its third meeting in Paris in October 1954, a draft ISO Recommendation for Methods for Grading Muscovite Mica Blocks, Thins and Condenser Films which was finally accepted at the fourth meeting in Harrogate (UK) in June 1958. The classification of muscovite mica adopted in this standard also represents to a substantial extent agreements reached at the international level by ISO/TC 56 — Mica.

Copies of the standard, published in English and priced at Rs. 1.50 are available from the offices of the Indian Standards Institution, at New Delhi, Bombay, Calcutta and Madras.

INSTITUTION OF CHEMISTS (INDIA) ASSOCIATESHIP EXAMINATION, 1959

The Ninth Associateship Examination of the Institution of Chemists (India) will be held in November, 1959. The last date for Registration is 31st March, 1959. The Examination in Group A (Analytical Chemistry) is divided into the following ten Sections and each candidate will be examined in two of them according

"Registered No. M. 7050."

CLRI Publications

PROCESS BULLETIN No. 1: Adapted processes for t manufacture of box and willow sides—Re. 1/- per copy. P age extra.

PROCESS BULLETIN No. 2: Processes for the manu ture of Glazed kid. Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 3: Manufacture of Roller sk Re. 1/- per copy. Postage extra.

PROCESS BULLETIN No. 4: Fish oil of the West Co for the Indian Leather Industry. Re. 1/- per copy. Postag extra.

PROCESS BULLETIN No. 5: Rapid Tannage of Sc Leather. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON EAST INDIA TANNING INDUSTI AND TANNING AGENTS (1955): Proceedings, discussi and papers presented. Re. 1/- per copy. Postage extra.

SYMPOSIUM ON "RAW HIDES & SKINS"—Curing Preservation (1957): Proceedings and Papers. Re. 1/- copy. Postage extra.

SYMPOSIUM ON "LEATHER AUXILIARIES" (Proceedings and Papers. Re. 1/- per copy. Postage

For further information please contact
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