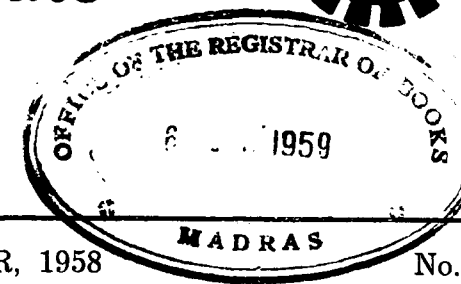


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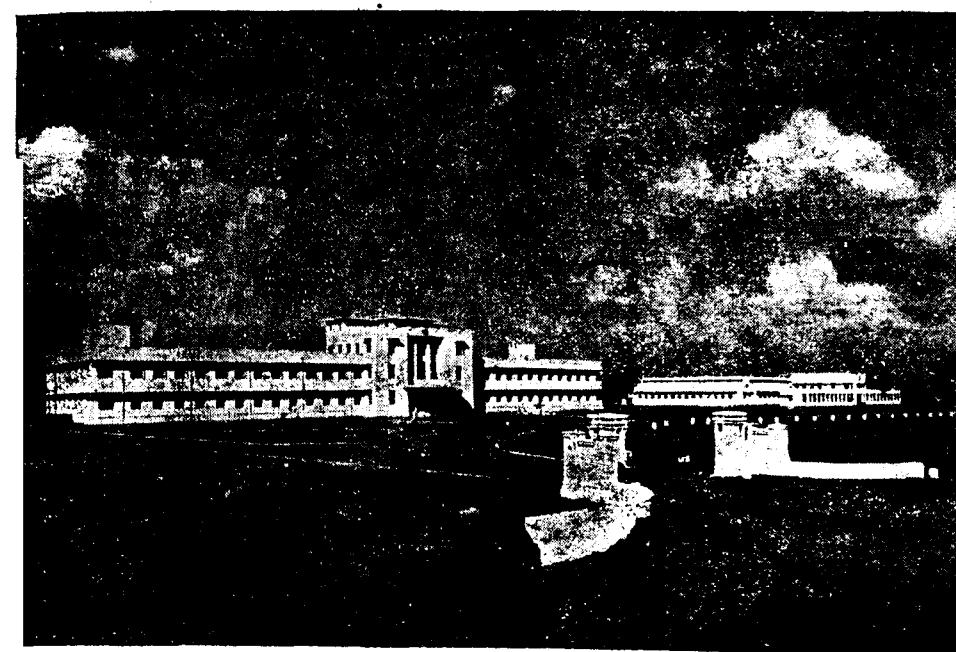
Vol. V

OCTOBER, 1958

MADRAS

No. 3

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COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
INDIA

Bulletin of The Central Leather Research Institute

Vol. V

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CONTENTS

Studies on Shrinkage Phenomenon—Pt. III Formaldehyde Combination Tannages —Y. Nayudamma & K. S. Jayaraman ..	91
Research Bears Fruit—Practical Demonstration No. 6 (Second Series)—Manufacture of White Glove and Lining Leathers using Basic Aluminium Sulphate ..	98
Technical Seminars	
(1) Mechanism of Resole Stage in the Phenol Formaldehyde Resinification —Lourdu M. Yeddanapalle, S. J. ..	102
(2) Leather Industry in Yugoslavia —The Yugoslavian Trade Delegation ..	103
(3) On Raw Hides and Skins from Different Breeds of Animals of Uttar Pradesh —R. Bhaskaran ..	104
(4) C-Terminal Amino Acids of the Constituent Proteins of Hides and Skins —K. Thomas Joseph ..	107
Classified Abstracts ..	108
Notes & News ..	126
C. L. R. I. News ..	130

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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 Managing Editor, C. L. R. I., Madras-20.

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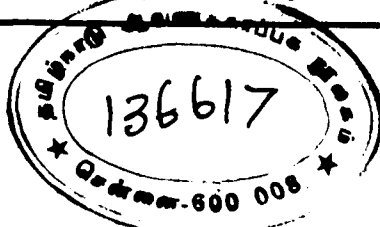
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STUDIES ON SHRINKAGE PHENOMENON—Pt. III FORMALDEHYDE COMBINATION TANNAGES

BY

Y. NAYUDAMMA & K. S. JAYARAMAN,
Central Leather Research Institute, Madras

(Received on 5th June 1958)

SUMMARY

Based on the shrinkage temperature data certain interpretations were made earlier in regard to the mechanism of formaldehyde combination retannages. Some quantitative data have now been obtained in regard to the fixation of formaldehyde in the combination tannages and these data confirm the previous findings and postulates.

In Part I of the studies,¹ the results obtained in regard to the hydrothermal stability of single collagenous material tanned with various tanning agents in combination with formaldehyde were discussed. It has been felt that further clarification of the interpretation of these results could be made, if along with the shrinkage temperature data, the bound formaldehyde contents in the leathers were determined. Such data have since been obtained and presented in this paper.

Experimental. The experimental procedure is exactly the same as outlined in Pt. II of the series.² Acetone dehydrated pelt pieces were properly wetted back and tanned with individual tanning materials, namely, Basyntan FC., basic chromium sulphate, basic aluminium sulphate, fish oil, Immergan, calgon, wattle extract and myrobalan extract. Leathers tanned with individual tanning agents were tested for their shrinkage temperature. Portions of these materials were retanned with a definite amount of formaldehyde

TABLE I

Nature of Pre-tannage.	pH of pre-tannage.	T _s °C.	Nature of re-tannage.	pH of re-tannage.	T _s Expt.	T _s (control straight F. tannage °C)	Bound HCHO m.eq./100 H.S.	
							Expt.	Control (Straight F Tannage).
1. Syntan	..	2.0 2.0	HCHO	2.0 7.0	72.5 74.0	— 84	7.3 8.2	6.4 26.91
2. Calgon	..	2.5 2.5	"	2.5 7.0	63 81	— 84	Negligible 45.13	6.8 26.91
3. Chrome	..	3.5 3.5	"	3.5 7.0	122 124	75.5 84	4.65 36.98	19.34 26.91
4. Aluminium	..	4.0 4.0	"	4.0 7.0	89.5 92	80 84	13.86 36.66	20.16 26.91
5. Fish Oil	..	—	"	7.0	80	84	33.68	26.91
6. Immorgan	..	—	"	7.0	82	84	78.45	26.91
7. Wattle Tanning	..	4.0	"	4.0	102	81	116.20*	23.66
8. Myrobalan Tanning	..	3.5	"	3.5	82	75.5	92.70*	19.34

* Formaldehyde determined by difference between the amount given and amount found in exhaust solution.

at two pH values, namely (i) at the pH of pretannage and (ii) at pH 7.0. Fresh acetone dehydrated pelt pieces were also tanned directly with formaldehyde at these two ranges of pH. The leathers so obtained were tested for the bound formaldehyde content and shrinkage temperature. The bound formaldehyde was obtained by determining the amount of formaldehyde in the tan-bath before and after formaldehyde tanning, employing the method of Highberger and Retzsch.³

The results so obtained are recorded in Table I.

Data and Discussion

1. *Syntan pretannage and HCHO retannages.* At pH 2, the shrinkage temperature of the leather is increased by retannage. The amount of formaldehyde fixed is approximately the same as that of the straight formaldehyde tannage. Even at pH 7, the amount of formaldehyde bound on retannage is only slightly increased as compared to retannage at pH 2.0 and is considerably less as compared to the straight formaldehyde tannage. The increase in the shrinkage temperature at both pH 2 and 7 is probably due to the small amount of formaldehyde fixed. Basyntan FC. is claimed to have a specific affinity for the basic groups of the protein and evidently it has inactivated such groups accounting for the low fixation of HCHO both at pH 2 and 7. As postulated in the previous paper, the syntan sulphonic acids repress only the ionic groups and formaldehyde may still react with other groups such as acid amide and peptide groups to form cross-links. The amount of formaldehyde fixed may be accounted for by this reaction and cross-links of amide and peptide groups would increase the shrinkage temperature. It is, therefore, evident that the rise in shrinkage temperature need not necessarily be due to the reaction of the formaldehyde with amino groups only and even the reaction with acid amide and peptide groups can account for the hydrothermal stability.

2. *Calgon pretannage and formaldehyde retannage.* At pH 2.5, the bound formaldehyde is negligible. This very clearly shows that at pH 2.5, polymeric phosphoric acid of the calgon effectively blocks both the ionic and nonionic groups and therefore, formaldehyde has no reactive groups available. However, when the same leather is pretanned with calgon at pH 2.5 and retanned with formaldehyde at pH 7, the bound formaldehyde is very large and the shrinkage temperature also is high. This is probably due to the fact that while retanning at pH 7, the polymeric phosphoric acid becomes a salt which does not fix with the protein. It is known that the greatest fixation for calgon is at pH 2.5. Thus, all the basic amino and other groups are released at pH 7.0 and become available for the formaldehyde to react. But surprisingly the amount of formaldehyde fixed in the calgon leather retanned at pH 7.0 is approximately double that of the straight tannage of the protein. This is probably due to the effect of salt (calgon) on formaldehyde tannage. Researches made earlier at this Institute⁴ have shown that certain salts present in the syntan increase the fixation of collagen.

3. *Chrome pretannage and formaldehyde retannage.* At pH 3.5, the amount of formaldehyde fixed on retannage is very low as compared to control. Though it is observed that T_s increases on retannage with HCHO, the increase is only about 7%. The amount of formaldehyde fixed is much lower than that obtained in the leather pretanned with syntan at pH 2. Whereas the syntan is specific for ionic groups, evidently chrome at pH 3.5 blocks the nonionic groups as well and the basic groups are utilised for buffering the acid hydrolysed from basic chrome salt during tanning. When the retannage is made at pH 7, it is probable that the chromium might be precipitated and the protein bound and the chrome bound acids neutralised releasing the amino groups for further reaction with formaldehyde accounting for the high fixation of formaldehyde but the

amount of formaldehyde fixed is much greater as compared to the controls. This is probably again due to the salt effect.

4. *Aluminium sulphate pretannage and formaldehyde retannage.* The trends are very similar as in the case of chrome tannage indicating that the mechanisms of aluminium and chrome tannages may be very similar, confirming the earlier formaldehyde studies. 335

5. *Fish oil pretannage and formaldehyde retannage.* At pH 7 the amount of formaldehyde fixed is more than that obtained for straight formaldehyde tannage. Shrinkage temperature of the fish oil tanned leather is much increased, though it is less than that of the control. Formaldehyde tanned leather with low amount of formaldehyde has higher shrinkage temperature than the fish oil retanned leather with a higher formaldehyde content. But the percentage increase of T_s is very nearly the same in both the cases. The high amount of formaldehyde fixed is probably due to the fact that the basic amino groups are readily available indicating that they were not used up in the fish oil tannage. It is expected at pH 7 that only basic uncharged groups of lysine are available. But it is probable that during oil tannage, conditions may be so obtained that the arginine groups may also come into play at this pH accounting for the additional fixation of formaldehyde without increasing the hydrothermal stability.

6. *Immergan pretannage and formaldehyde retannage.* The pretreatment with Immergan evidently activates the group reactive towards formaldehyde or makes available greater number of reactive centres for fixation of formaldehyde as the amount of formaldehyde fixed at pH 7 is approximately three times that obtained in the control straight formaldehyde tannage. The shrinkage temperature on retannage is also increased but not commensurately with the fixed formaldehyde. In fact, shrinkage temperature of straight formaldehyde tanned leather is greater than that

of Immergan pretanned leather. Shrinkage temperature of Immergan tanned leather is only 55°C as compared to that of dehydrated pelt at 64°C thus accounting for about 49% increase in shrinkage in retanning whereas in straight tannage, the rise in shrinkage is only 31%. Immergan is known to react with basic amino groups of the protein and the amount of formaldehyde fixed on retannage is expected to be lower as compared to straight tannage. But the fixation is trebled. Either the sulphonamide that is formed is extremely reactive and firmly fixes formaldehyde, or during the Immergan tannage even at pH 7, other reactive groups like the arginine might be activated to react readily with formaldehyde. The probability is in favour of both.

An NH_2 group may hold 2 moles of formaldehyde whereas sulphonamide RSO_2NH can react with only one CH_2O . However the fixation here may be quicker and firm as compared to reaction with NH_2 group.

7. *Wattle and Myrobalan pretannages and Formaldehyde retannage.* In the vegetable tannage studies, retanning was not done at pH 7 as the vegetable tannin will be stripped out. Retannage was limited to the pH of pretannage. Here again, the earlier postulates are further confirmed in that the amount of formaldehyde fixed is very large when vegetable tanned leather is retanned with formaldehyde but as compared to myrobalan pretannage, the wattle tanned leather fixes more formaldehyde. The amount of formaldehyde fixed in both the cases is about 4-5 times that of the straight formaldehyde tannage. Evidently all this could not be fixed to the protein and particularly so when some of the basic groups are inactivated by the vegetable tannin pretannage. It is very clear then that vegetable tannin offers itself as a suitable site for further cross-linking with formaldehyde. This cross-linking might happen straight by the vegetable tannin itself or it may be cross-linking with vegetable tannin on the one side and with the

reactive groups of the protein on the other. With myrobalan tannage, the original shrinkage temperature is low and even after retannage, the shrinkage temperature is no doubt increased but the rise is not as great as that observed in retannage of wattle tanned leather and the amount of formaldehyde fixed is also less. This again clearly shows that the affinity of the tannins for collagen and the type of linkages involved have a bearing on the shrinkage temperature values as well as on the further fixation of formaldehyde.

These data conclusively confirm the postulates outlined in Part II of this series based only on the shrinkage data.

REFERENCES

1. Y. Nayudamma and T. S. Ranganathan, *Bull. C.L.R.I.* 2, 319 (1956).
2. Y. Nayudamma and T. S. Krishnan, *ibid*, 2, 397 (1956).
3. J. H. Highberger and C. E. Retzsch, *J.A.L.C.A.*, 33, 341 (1953).
4. Y. Nayudamma, K. S. Jayaraman and T. S. Krishnan, *J.A.L.C.A.*, 52, 238 (1957).

RESEARCH BEARS FRUIT

Practical Demonstration No. 6

(Second Series)

Manufacture of White Glove and Lining leathers using Basic Aluminium Sulphate*

BY

R. SELVARANGAN, M. A. GHANI & Y. NAYUDAMMA

Raw material: Wet-salted sheep skins.

Soaking: The wet-salted skins are washed twice with water and then soaked in water for one hour. They are then removed, weighed and taken for liming.

Liming: A sulphide paste of the following composition is prepared:

Fused sodium sulphide:	3%	(on soaked weight)
Common salt:	3%	do.
Slaked and sieved shell lime:	9%	do.
Water:	15%	do.

The paste is applied on the flesh side of the skins, which are folded and piled and kept covered with gunny bag. They are left in this state for one hour and then unhaired and limed in pits using the following:

Old lime liquor:	200%	(on soaked weight)
Water:	200%	do.
Lime:	5%	do.

The skins are handled in the liquor for three days and on the fourth day they are scudded and relimed with:

Lime:	10%	(on soaked weight)
Water:	400%	do.

*Process demonstrated during Sept./Oct. 1958.

The skins are handled in the fresh lime for four days, and on the fifth day, they are fleshed by machine, washed and scudded.

Deliming: Using the following:

Lactic acid:	¼%	(on soaked weight)
Water:	200%	do.

the limed stock is delimed slightly and left in water overnight.

Bating: Bating is carried out in a paddle for 2 hours keeping the bath at 38°C using the following:

Pancreol 5A:	1½%	(on soaked weight)
Water:	350%	do.

Deliming: The bated stock is then scudded, washed and delimed for 30 minutes with the following and then rescudded, washed and weighed.

Lactic acid:	¼%	(on soaked weight)
Water:	200%	do.

Pickling and Bleaching: The delimed pelts are then pickled and bleached in a drum using the following:

Sulphuric acid:	¾%	(on delimed pelt weight)
Sodium chloride:	10%	„ „
Sodium dichromate:	1/6%	„ „

They are drummed in the above bath for one hour and left overnight in it.

Depickling: The pickled pelts are depickled using the following:

Hypo:	1½%	(on delimed pelt weight)
Water:	100%	„ „

Depickling is carried out in a drum which is run for 45 minutes.

Tanning : The skins are then tanned using :

Aluminium sulphate :	20%	on delimed pelt weight
Sodium citrate :	1 1/3%	„ „
Sodium sulphate :	1.5%	„ „
Soda ash :	6 2/3%	„ „
Water :	70%	„ „

The drum is run for two hours and a further quantity of soda ash (1%) is added as a 10% solution slowly in instalments to increase the pH of the tanning bath to 4.5 without precipitation and the drumming is continued for further 2 hours. The skins are then removed from the bath and hung up for drying. Next day morning the skins are set, sammed, and shaved to 0.5 m.m. The skins are then placed in the same tan liquor and the drum is run for one hour and then 1% formaldehyde (40% strength) is added to the bath and the drumming continued for two hours. The skins are then taken out and piled.

Fatliquoring : A fatliquor of the following composition is prepared as follows :

Coconut oil :	1.75%	on delimed pelt weight
Castor oil :	0.75%	„ „
CLRI Cationic Emulsifier No. 5 :	} 0.5%	„ „
Acetic acid :		
Water (80°C)	0.05%	„ „
	25%	„ „

The first four are made into a homogeneous mixture and added with stirring to the hot water till an emulsion is formed.

This emulsion is fed in the course of 5 minutes into the running drum containing the exhaust aluminium tanning liquor. The skins are then thrown in and the drum is run for 45 minutes. The skins are removed and piled for two hours. They are then washed with water for 5 minutes in the drum. The skins are removed from the drum and sorted as gloving and lining leathers. Very white leathers

with good grain or free from flaying cuts are taken for finishing as glove leathers. The rest are finished as lining leathers.

Refatliquoring for glove leathers : The leathers selected for glove are refatliquored with an anionic fatliquor prepared as follows :

Sulphated cotton seed oil :	1/2%	on delimed pelt weight
Castor oil :	0.5%	„ „
Cotton seed oil :	0.5%	„ „
Nonionic emulsifier		
Triton X 100:	0.05%	„ „
Hot water (50°C) :	75%	„ „

The stock is drummed in this fatliquor for 30 minutes and, removed and piled up overnight.

Resin stuffing for lining leather : The lining stock is taken in a drum containing 50% water as float and 0.05% Triton X 100. The leathers are drummed for 5 minutes and to this is added slowly in the course of 10 minutes.

Fast coating bottom O : 1% solid content on the (or any acrylic resin emulsion weight of lining stock. like Bedacryl, Primal B40, etc.).

The drum is run for 30 minutes. The leathers are then removed and piled up overnight.

Setting : The leathers are set by hand (or machine) and hung up for drying.

Staking : The leathers are staked before completely dry. After the first staking the leathers are allowed to dry and then given a second staking.

Finishing : The staked leathers for linings and glove are now buffed and snuffed (if necessary) for grain correction and trimmed. In the case of white linings, Bedacryl 188A (or Fast coating bottom O or any other similar material) diluted once with water is padded on the grain side of the trimmed lining and then the leathers are dried and plated.

TECHNICAL SEMINAR

Mechanism of Resole Stage in the Phenol Formaldehyde Resinification*

BY

LOURDU M. YEDDANAPALLE, S. J.
Professor in Chemistry, Loyola College, Madras

While the B and C stages in the reaction between phenol and formaldehyde have been much studied, little attention has been devoted to the A stage. In the present work, the reaction between phenol and formaldehyde in the presence of alkaline catalysts has been studied with particular reference to the A stage, i.e., corresponding to the formation of resoles. The kinetics of the reaction have been studied with varying proportions of the two reactants and the order of the reaction has been determined. For following the course of reaction, uni-dimensional paper chromatography has been employed. The Arrhenius parameters have been calculated and the results obtained conform to what may be expected on the basis of electronic theories of organic reactions.

*Summary of the talk given on 22-8-1958.

TECHNICAL SEMINAR

Leather Industry in Yugoslavia*

BY

The Yugoslavian Trade Delegation

The Yugoslavian Leather Industry is comparatively old and is equal to, if not better, than its counterparts in other European countries. There has been a good amount of Post-war development. While before the War, Yugoslavia used to export raw materials, now she takes up all her domestic resources for local production and is importing raw materials like cattle hides, goat skins, etc., from a number of European, American and African countries. Leathers of various kinds are manufactured in the country. However, sole leather produced in Yugoslavia is different from that usually manufactured in other countries, in that it is heavier and stronger, so as to suit the rigorous climatic conditions come across. The important indigenous tanning materials are oak and chestnut. A certain amount of quebracho and mimosa is imported. 90% of the potential capacity of the Industry is being utilised and the problem is now to produce enough for local consumption as well as for export.

Actually three different kinds of sole leather are prepared according to their mode of use in shoe making and to the climatic conditions to be guarded against. Upper leathers of both vegetable and chrome tannage are in use. The vegetable tanned upper leathers are used with the flesh side out and the grain side in. Combination tanning is not in vogue. For vigorous conditions like use in snow, a special kind of chrome upper leather containing a high percentage of fat is prepared.

The upper leathers are merely glazed and correction of grain or embossing is not practised.

*Summary of the talk delivered on 5-9-1958.

TECHNICAL SEMINAR

On Raw Hides and Skins from Different Breeds of Animals of Uttar Pradesh

BY

R. BHASKARAN

A survey tour of U.P. was undertaken, with a view to collect reliable samples of hides and skins from known breeds of animals. The samples of hides and skins thus collected will be studied from the leather-making, histological, bacteriological and biochemical points of view. The following centres in the various parts of the State were visited :

Lucknow, Kanpur, Bikapur, Sevapuri, Banaras, Bareilly, Izatnagar, Mukteswar, Agra and Etawah.

The organized breeds of cattle and other animals used for improving local stock are as given below :

Cattle : Kosi, Kherigarh, Ponwar, Gangatheri, Kan-katha, Haryana, Medum Haryana and Sahiwal.

Buffaloes : Murrah, Tarai and Badawari.

Goats : Jamnapari, Barbari and Oudh.

Sheep : Bikanari.

In addition to the above, there are certain ill-defined non-descript types which are commonly called Desi. The collection of cow hides from slaughtered stock was greatly handicapped due to the banning of cow-slaughter in the

*A summary of the talk delivered on 12-9-1958.

State. The cattle hides have been collected mainly from Government cattle farms and Gosadan. Hides and skins of other animals were collected from slaughter houses only. Hides from Murrah buffaloes have been found to give the heaviest hides, 75 lbs. and higher.

The Tarai, Badawari and Desi types yield hides weighing about 60 lbs. The Jamnapari goats are tall, giving rise to leggy types of skins with coarse hairs. The Barbari goats are a fine breed of domesticated animals giving fine silky skins. Skins of Oudh variety are comparatively smaller when compared with Jamnaparis. The hides collected were, relatively speaking, poorer in quality in view of the severe summer. Bedsores and brush marks were common, especially because of the fallen nature of hides. The other types of defects in these, were, sore marks, rub marks, thorn marks or scratches, goad marks, horn rakes, vulture marks, tick marks, warble holes, yoke marks, lice marks, ribby hides, poor substance and spider marks. At the time of the visit, rinderpest was said to be prevalent widely and about 50% of the hides collected could have been from animals affected by this disease. The other diseases prevalent on cattle being Haemorrhagic Septicaemia, Black Quarter and Anthrax. The existing system for collection of hides after flaying, from villages, is such that considerable delay occurs between collection and delivery at the godowns where actually re-curing is done. This is especially harmful in the hot summer.

The beetles, *Dermestes maculatus* and other types and *Anthrenus* species were encountered on dry and dry-salted hides. The beetle, *Dermestes maculatus* was found to breed on bone meal and on similar substances in addition to hides and from these they migrate to the hides.

A few remarks about the village tanners may not be out of place. These people do not use any costly chemicals. Along with lime, a kind of earthy material collected from

nearby hills, called *Rhei*, is used. For tanning, they use *Mowa* leaf infusion. These leaves are obtained free of cost from nearby forests. Another tanning material used, is the mango bark—actually a parasite, living on the mango tree. After tanning, the leathers are not oiled, but given a thin coating of khari salt; this is said to keep the leather in pliable state.

TECHNICAL SEMINAR

C-Terminal Amino Acids of the Constituent Proteins of Hides and Skins*

BY

K. THOMAS JOSEPH

The C-terminal amino acids of collagen, gelatin, citrate soluble collagen, neutral salt soluble collagen, elastin, reticulin, wool, skin albumin, globulin and mucoids have been investigated by the thiohydantoin method. The results obtained by applying this technique, regarding the C-terminal amino acids of the different proteins are critically discussed.

*A summary of the talk delivered on 19-9-1958.

CLASSIFIED ABSTRACTS

PROCESSES PRIOR TO TANNING

COMPLEX PHOSPHATES IN THE TANNING OPERATIONS. Luigi Merlo, Tommaso Cubeddu, and Antonio Ramondetti (Montecatini, Milan). *Cuoio, pelli, mat. conciati* 33, 505-15 (1957); *Chem. Abstr.* 52, 10622 (1958). Complex phosphates show the property of sequestering Ca, Mg, and Fe ions, and when used as a pretanning agent in the vegetable tannage, give leather of a clear and uniform colour and a high hide substance content; the flexibility of such leather is higher than that of normally tanned leather, and the abrasion resistance is about doubled. Hides may absorb up to 0.8% P_2O_5 calculated on dry basis, and in the pretanning 0.2% of Na tripolyphosphate should be used (calculated on the green weight of the hides). In the manufacture of chrome leather the treatment with phosphates is made between the chrome and other baths.

UNHAIRING WITH MOLD ENZYMES. A. Simoncini and P. Oreste (Staz. Sper. ind. Pelli, Naples), *Cuoio, pelli, mat. conciati* 34, 3-21 (1958); *Chem. Abstr.* 52, 10619 (1958). The growth of the molds on several culture media was examined. The most useful medium was Waksman soil containing some kidney bean or bran infusion, but the maximum of activity of enzymes was shown by the molds grown on solid bran medium. Nineteen molds were examined; the enzymes were recovered by filtering the cultures maintained 12 hours at 37°. The maximum of activity on keratin (prepared from hen quills) was shown by the enzymes of *Aspergillus parasiticus* (I), *A. oryzae*, (II), and *Dothiorella ribis*; the maximum of activity on gelatin (5% gel) was shown by *Nocardia brasiliensis*, I, and II; the maximum of activity on casein (Fuld-Gross method) was shown by *Ustilago zaeae*, *Candida tropicalis*, *Penicillium flavocinereum*, *Endothiella girosa*, and *Verticillium nigrescens*. The practical unhairing tests on sheep skins show that the enzymes from I and II are the most active. The enzyme from *Sclerotium rolfsii* show unhairing properties; after 24 hours of action the skins become weak and can be torn very easily.

VEGETABLE TANNING

RECENT SOUTH AFRICAN DEVELOPMENTS IN RAPID SOLE LEATHER TANNAGE, S. G. Shuttleworth (*Leather Inst., Grahamstown, S. Africa*). *Cuoio, pelli, mat. conciati* 33, 442-59 (1957). *Chem. Abstr.* 52, 10622 (1958). Rapid vegetable-tanning processes with only wattle extract are described. Hides are first pickled, eventually with 2.5% phosphate added to the pickling bath, then tanned in pits containing diluted tanning solution at pH 3.0 and 20-5° Barkometer, then in a series of 4-6 pits at 67-100° Barkometer and pH increasing from 3.1 to 3.3, 1 day in each pit. A strict control of pH is necessary, and the exact values are obtained by adding small amounts of H_2SO_4 or modifying the amount of acid added to the pickle. Tannage can be completed with a treatment in drum with powdered extracts and fillers.

THE ACCELERATION OF THE TANNING PROCESS BY MEANS OF ULTRASONIC DISPERSION OF THE SOLUTIONS. V. M. Fridman and A. N. Mikhailov. *Legkaya Prom.* 18, No. 3, 13-14 (1958), *Chem. Abstr.* 52, 11451 (1958). Results of experimental work contradict the statement of Gutmann that ultrasonic waves impede rather than promote the dispersion of tanning materials in suspension. For a tan liquor containing oak and willow extracts and 2 syntans the times required for 100% penetration of a hide sample under the influence of ultrasonic wave action of frequencies from 22 to 500 kilohertz by magnetostriction and piezoelectric techniques were 20 and 32 hours, respectively in comparison with 48 hours for the control.

CHROME TANNING

THE ROLE OF BUFFERS IN CHROME TANNING. B. Krasowski, *Prazegląd Sforzany* 1955, No. 5, 102-7; *Polish Tech. Abstr.* No. 2, Abstr. No. 4233 (1956). *Chem. Abstr.* 52, 10621 (1958). Buffer mixtures are used in single-bath chrome-tanning, particularly during neutralizing to increase the alkalinity of tan liquor. The substitution is studied of Na_2SO_3 or $NaNO_2$ for soda commonly used for neutralizing the acidity of Cr-tanning baths; these salts have a favourable effect on leather. Small quantities of Na_2SO_3 mask Cr very strongly, and even large amounts of NH_3 prevent the precipitation of alkaline Cr salts. $NaNO_2$ does not mask Cr in the presence of NH_3 , but it can be used for neutralizing without displacing previously introduced masking ions. $NaNO_2$ was superior to Na_2SO_3 for neutralizing in Cr solutions.

OTHER TANNAGES

RESIN TANNING WITH ETHERIFIED HYDROXYMETHYL MELAMINE Yoshikazu Hachihama and Yojuro Kyogoku (Osaka Univ.). *Technol. Repts. Osaka Univ.* **6**, 397-402 (1956). *Chem. Abstr.* **52**, 10622 (1958). The tanning action of etherified hydroxymethyl melamine (I) was studied to determine the relation between degree of etherification and the tanning property. Methylated I gave full and supple leather which does not harden on standing, but the tanning potential decreases with increasing degree of etherification. Butylated I gave very supple but thin leather by solvent tannage.

SULFUR FAT TANNING. I. BINDING SULFUR WITH COLLAGEN IN THE PROCESS OF SULFUR TANNING. R. Dzieza, *Prad. Inst. Prezemyt Skor.* 1956, No. 1, 77 pp.; *Polish Tech. Abstr.* No. 1, *Abstr.* No. 4696 (1957), *Chem. Abstr.* **52**, 11451 (1958). Unbound S was determined in S-tanned leather by extraction with CS_2 , CCl_4 , toluene and C_6H_6 , the best results being obtained with toluene. Cystine, cysteine, methionine, and taurine were not detected in raw leather, and cystine, cysteine, methionine, lanthionine and sulfinic acids were not detected in S-tanned leather. An amino acid with a sulfonic group of the taurine type was detected. Collagen was hydrolyzed with HCl , H_2SO_4 , H_3PO_4 , a mixture of HCl and HCOOH , $(\text{CH}_3\text{CO})_2\text{O}$, $\text{Ba}(\text{OH})_2$, NaOH , and enzymically. Amino acids were separated by modified Dakin, Fischer, and Foremann-Jones methods and also by chromatography. The influence exerted on the content of S (general and bound) by blockage of amino groups was determined with HCHO at pH 2-10 in S-HCHO tanned leather. The amount of bound S diminished with increased HCHO concentration and with pH of the solution. The blocking of amino groups with picric acid reduced by 50% the amount of bound S in S- HNO_3 -tanned leather. Deamination of collagen reduced the content of bound S by 50%. S-tanned leather stored for 3 years was not subjected to deamination. Guanido groups influence the amount of bound S in S-tanned leather. Blocking carboxyl groups did not reduce the content of bound S in S-tanned leather. Hydroxy groups of tyrosine, serine, and hydroxy-proline did not influence the content of bound S. Collagen saturated with Na_2SO_3 , NaHSO_3 or with SO_2 gave a leather with properties of S-tanned leather. Saturating collagen with Na_2SO_4 and rinsing with water after 3 weeks' storage gave a product with properties of untanned

leather which contained no bound S. In S tanning, two polypeptide chains were connected by means of amino groups and polythionic acid.

PROCESSES AFTER TANNING

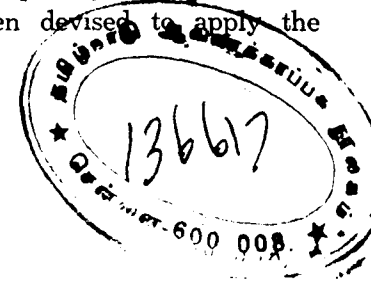
DYEING BLACK GLACE LEATHER. Alberto Simoncini (Staz. sper. ind. Pelli, Naples). *Cuoio, Pelli. mat. concianti* **33**, 5616-31 (1957), *Chem. Abstr.* **52**, 11452 (1958). Comparative dyeing experiments were made with several dyes on Cr. tanned kid skins; the maximum of resistance to rubbing is given by hematine (with $\text{K}_2\text{Cr}_2\text{O}_7$ as oxidizing agent and FeSO_4 as mordant) or by diazo black; the minimum of washing resistance is given by the acid blacks and the maximum by the vat black. The only disadvantage of dyeing with hematine is that leather shows a decreased strength.

NEW DYEING PROCESSES WHICH CREATE FAST COLOURS IN LEATHER. J. S. Kirk, *Leather Trades Review*, **129**, 236 (1958). The recent attempts by glove, garment and upholstery tanners to improve the quality of their dyeings, have met with considerable success and it is now possible to produce dyed leathers which compare to textiles in fastness to light, to soaping and to solvent cleaning. To achieve these ends, the tanner has modified both his methods of tanning and his processes of colouring. Several types of dyes and new dyeing techniques have been devised. The new dyes are direct and chrome dyes, azoic and naphthol dyes, leuco ester vat dyes and sulphur dyes.

The direct and chrome dyes are used extensively to produce extremely fast dyeings in garment leathers. Their application involves no change in existing procedures. Since temperatures of 140°F or above are required to insure full chroming of the dye-stuff, the dyes are generally restricted to the easily chromed types.

Azoic or naphthol dyes are used extensively in glove and garment leathers, especially when high resistance to soap washing is required. (However, they are much less fast to solvents than the direct and chrome dyes). These are applied to leather in the drum as naphtholates using a slight excess of caustic soda. They are exhausted from the solution by the acid in the leather and by addition of acid. Colour is developed by adding sufficient diazobase. Recently methods have been devised to apply the colours by spray or brushing.

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Leuco esters of the vat dyes are substantive to leather, and are excellently light fast. For medium and pastel shades, they may be applied to chrome leather in the blue or in the crust and are developed in acid solutions by mild oxidation with either peroxide or sodium nitrate. These dyestuffs have considerable application on suede garment leather and glove leather.

The sulphur dyes are a class of vat dyes, reduced to the leuco state by sodium sulphide; they are substantive to leathers than vat dyes but require highly alkaline conditions for application. It is difficult to obtain satisfactory dyeing with sulphur colours. Full shades are difficult to obtain.

— V. S. P.

TESTING

THE EFFECT ON SHOE LEATHER WATER ABSORBABILITY OF MULTIPLE SOAKING AND DRYING. E. Raabe and M. Witanowski. *Przegląd Skorzany*, 1956, No. 9, 221-4; *Polish Tech. Abstr.* No. 3, Abstr. No. 4999 (1957), *Chem. Abstr.* 52, 11451 (1958). Water absorbability was determined of Russia leather soles and black chrome-tanned box calf subjected to multiple soaking and drying. Samples were acclimatized over a saturated NaNO_2 solution and weighed, and the relative water absorbability was determined after 2 hours and 24 hours of soaking. The samples were then dried at 25°, acclimatized again, and weighed, and water absorbability was determined. In vegetable tanned leather water absorbability increased initially to become constant after between 4 and 5 consecutive soaking-and-drying treatments. In chrome tanned leather, water absorbability diminished and became constant after 4 treatments. Multiple soaking caused increasing loss of weight in Russia leather and sole leather, but no such loss was recorded in chrome leather.

AGEING OF FINISHED LEATHER. J. Drezner. *Przegląd Skorzany*, 1956, No. 2, 1-4; *Polish Tech. Abstr.*, No. 4, Abstr. No. 4536, *Chem. Abstr.* 52, 11452 (1958). Ageing of finished leather was investigated by natural methods as well as by accelerated methods in a Fade-Ometer apparatus. The chemical composition of leather aged naturally during storage for 18 months changed only insignificantly, and tensile strength increased or decreased only slightly. Accelerated air ageing for 18 months caused the tensile strength to decline from 11 to 36% and the chemical composition to change gradually. Accelerated ageing in a Fade-Ometer

apparatus caused reduction in tensile strength (with the exception of Ferrigan hides), and changes in chemical composition. Hides aged by treating with H_2SO_4 or H_2O_2 showed a considerable degree of destruction. Natural and accelerated ageing tests proved leathers after carrying (Russia leather and sleeked leather) were more resistant to ageing than were others.

THE INFLUENCE OF MOISTURE IN SHOE MATERIALS ON THEIR HEAT-INSULATING QUALITIES. E. A. Miroshnikov, *Legkaya Prom.* 18, No. 3, 30-2 (1958), *Chem. Abstr.* 52, 11451 (1958). For calfskin, Russia leather, pigskin and sole leather the value of the heat-transmission coefficient was practically a linear function of ω , the moisture content up to 35%, conforming with the equation $\lambda_1 = \lambda_0 [1 - \mu(\omega_2 - \omega_1)]$, where λ_1 and λ_2 are the coefficients after and before wetting, $\omega_2 - \omega_1$ the increase in water content, and μ a constant characteristic of the kind of leather, determined as 0.008, 0.002 and 0.004 for calf, Russia, and sole leather, respectively. Above the critical 35% moisture value the slope rises sharply owing to the transition to a continuous water phase through which heat is conducted rapidly. Thus, for calfskin with $\lambda \times 103 = 50$ at 5% moisture, it rises to 65 at 35% and to 140 at 55%.

METHODS OF DETERMINATION OF SOLUBLE MATTER IN LEATHER. Enrico Simoncini (*Staz. sper. ind. Pelli, Naples*). *Cuoio, pelli. mat. concianti* 33, 460-8 (1957); *Chem. Abstr.* 52, 10622 (1958). Comparative analyses were made by International shake method, Swiss method, Koch extraction method, and American Leather Chemists Association method. A complete extraction of soluble matter from leather is never obtained, even with a very long treatment; with the above methods, only 52 to 77% of the presumable total soluble matter contained in the leather is extracted. If slight changes are made in the specifications of each method, identical results may be obtained; these changes are: International method, extraction at 50°; Swiss method, ashing with addition of H_2SO_4 ; A.L.C.A. method, extraction of 10 g. leather at 20° with previous digestion of the sample in H_2O for 17 hours; Koch extraction method, no change.

MASKING NUMBERS AS A NEW INDEX FOR ANALYTICAL EVALUATION OF CHROME TANNING LIQUORS OBTAINED FROM REDUCING DICHROMATE WITH ORGANIC COMPOUNDS. W. Lasek. *Przegląd Skorzany* 1954, No. 11, 243-9; *Polish Tech. Abstr.* No. 2, Abstr. No. 3491 (1955). *Chem.*

Abstr. 52, 10621, (1958). The masking number is the difference between the basicity calculated from the ratio of dichromate to mineral acid and the basicity determined by analysis.

WOOD BARK AND ITS PROPERTIES. A. V. Zhitkov. *Bumazh. Prom.* 33, No. 2, 4-6 (1958), *Chem. Abstr.* 52, 11412 (1958). Data are given for the relation between tree diameter (10 to 30 cm.) and bark thickness (2 to 7.5 mm.), bark moisture and d., and the moisture control and calorific value for spruce and pine bark. Pyrolysis of spruce bark gave a gas containing CO_2 47.7, C_nH_m 2.3, O_2 2.2, CO 19.4, H_2 20, and CH_4 4.15%, with a calorific value of 1800 kcal./cu. m. The yield of volatile acids, alcs., and resins was quite small and did not justify recovery. Preliminary drying to 40-5% H_2O followed by gasification of spruce bark gave a gas containing CO_2 10.4, C_nH_m 0.2, O_2 0.2, CO 22, H_2 11.2, and CH_4 2.3%, with an average calorific value of 1200 kcal./cu. m., and with a yield of 1.4 cu. m./kg. bone-dry bark.

TANNIN OF SPRUCEWOOD BARK. III. CHROMATOGRAPHIC SEPARATION OF TANNINS ON POLYAMIDE COLUMN. ISOLATION OF A SECOND AGLYCON FROM SPRUCEWOOD BARK TANNIN. Wolfgang Grassmann, Horst Endres, Wilhelm Pauckner, and Heinz Mathes (Max Plank Inst. Eiweiss-u. Lederforsch., Munich, Ger.). *Chem. Ber.* 90, 1125-8 (1957), *Chem. Abstr.* 52, 11413 (1958). More efficient than the previously described cellulose-silica gel column was the polyamide column described by Batzer and used for the separation of phenols. The aglycon mixture (6g) (from the enzymic hydrolysis of the glucosides) in 30 cc. H_2O -MeOH (1:1) was introduced into the column and eluted successively with 0.9 l. H_2O -MeOH (1:1), 3 l. (3:7), 1.5 l. (1:4), and 0.5 l. MeOH dropwise at 160 cc/hour. Five fractions were obtained (4.28 g. in all). The largest fraction (41.1%) evaporated gave the previously reported aglycon, $\text{C}_{18}\text{H}_{16-18}\text{O}_5$ (I), m. 216° , R_f value in BuOH - AcOH - H_2O 0.70. The next largest fraction (11.3%) evaporated gave a second aglycon, $\text{C}_{16}\text{H}_{16}\text{O}_5$ (II), colourless leaflets, m. $227-9^\circ$ (decomposition) (60% AcOH), R_f value 0.85, olive-green changing to red-brown in FeCl_3 , orange-red in concentrated H_2SO_4 . II (0.03 g) in 1 cc. 90% EtOH treated with 30 cc. 1% alc. $\text{F}(\text{O}_2\text{N})_2\text{C}_6\text{H}_3$ precipitated with 2 cc saturated NaHCO_3 and shaken 2 hours gave the $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3$ derivative (III) of II, long pale-yellow needles, m. 160° : III failed to decolourise KMnO_4 or $\text{Br}-\text{H}_2\text{O}$ and therefore, in contrast to I, II contains no double bonds. The other 3 fractions were not further investigated.

CONDENSATION OF PROTEINS WITH THIOCYANATE. F. Haurowitz (Indiana Univ., Bloomington). *Proc. Indiana Acad. Sci.* 65, 82-4 (1955) (Pub. 1956); *Chem. Abstr.* 52, 10244 (1958). The C-terminal amino acid groups of peptides and proteins are determined by condensing the terminal amino acid residues with thiocyanates in the presence of Ac_2O . Thus, edestin (I) containing 62 free carboxyl groups and having a molecular weight of 50,000 picks up 10.5 SCN residues per molecule after treatment with thiocyanate and Ac_2O (not further defined) at 100° for 30 minutes. Similarly treated (Protein, number of free carboxyl groups, molecular weight, and number of SCN residues incorporated) are: ovalbumin (II), 51, 44,000, 7.8; γ -globulin, 67, 156,000, 39.4; fibroin, 20, 100,000(?), 3.3; insulin (IV), 5, 6,000, 1.4; salmine (V), 0, 8,000, 0.2; ribonuclease (VI), 7, 15,000, 1.6; tyrocidin (VII), 0, 1,300, 0.2; polyglutamic acid, 93, 12,000, 7.8. IV, V, VI, VII containing little or no carboxyl groups combine with a correspondingly small number of SCN residues as expected. However, I, II, and III pick up more SCN residues than expected, which is attributed to rearrangement of the α -aspartyl or α -glutamyl residues into β -aspartyl or γ -glutamyl residues leading to a greater quantity of α -carboxyl groups.

DEVELOPMENT OF AMINO ACIDS BY ISATIN ON PAPER CHROMATOGRAMS. A. N. Boyarkin (K. A. Timiryazev Inst. Plant Physiol. Acad. Sci. U.S.S.R., Moscow). *Fiziol. Rastenii, Akad. Nauk S.S.S.R.*, 5, 86-7 (1958); *Chem. Abstr.* 52, 1027 (1958). The following 2 reagents are prepared for development of amino acids: (1) 1g. of isatin in 100 ml. of 95-97% EtOH , to which 1 ml. of concentrated AcOH is added; (2) 40 g. of dry Na silicate is dissolved in 10 ml. of 20% NaHCO_3 and heated to $60-70^\circ$. The chromatogram is first soaked in (1), dried and heated between two glass plates at $90-100^\circ$. The dry chromatogram is covered with (2), the excess of (2) removed with filter paper, and the chromatogram rapidly dried. The sensitivity of this reaction approaches that of the ninhydrin reaction; proline and hydroxyproline are the only amino acids whose colour is not stable. A table of colours produced by different amino acids is given. K silicate may be used instead of Na silicate; stability of developed spots to moisture is decreased when K silicate is used.

NEW PAPER-CHROMATOGRAPHY METHOD FOR DETERMINING REDUCING SUGARS IN WOOD HYDROLYZATES AND SULFITE LIQUOR. I. Z. Emel'yanova and T. A.

Batrakova (All-Union Inst. Hydrolysis and Sulfate-Alcohol Ind., Leningrad), *Zhur. Anal. Khim.* **13**, 142-7 (1958), *Chem. Abstr.* **52**, 11412 (1958). The separation of sugars is done on 12-14 strips 3 x 45 cm. On 10-12 of these is placed the unknown sample, on 1 or 2 the sample to which is added glucose, and on 1 or 2 the sample to which is added xylose. The latter strips are controls. A special micropipet is used to meter the sample. The upper ends of the strips where the sample is placed dip in a solvent made of 5:1:5 MeOAc-C₅H₅N-H₂O. The lower ends of the strips are pressed against the necks of receivers (flasks). The whole is placed under a glass bell, and the temperature is kept at 18-22°. A solution of 1.66 g. phthalic acid and 0.92 ml. freshly distd. aniline in 100 ml. EtOH is the developer. After the sugars are separated on the strips the latter are cut up, and the sugars are extracted and titrated. By this method 10-2500 γ of a sugar can be determined with an error of 2 γ .

ELECTROPHORESIS OF PROTEINS AT LOW pH IN AMINO ACID BUFFERS. E. F. Woods (Commonwealth Sci. and Ind. Research Organization, Victoria, Australia). *J. Phys. Chem.* **62**, 308-15 (1958), *Chem. Abstr.* **52**, 11142 (1958). Bovine serum albumin gave 2 moving boundaries on electrophoresis in buffers of amino acid hydrochlorides, at pH values between 2 and 3, and only 1 moving boundary in all other buffer mixtures studied. The ascending and descending patterns in the amino acid hydrochloride buffers were nonenantio-graphic but this appeared to be unrelated to heterogeneity of the protein or to the physico-chemical changes which occur at low pH values. From a study of the electrophoresis of bovine serum albumin in glycine-HCl under various conditions of pH, ionic strength, and protein concentration, it appeared that the faster moving descending boundary and the slower moving ascending boundary appearing between pH 2 and 3 were false boundaries. The behaviour of these boundaries does not fit the requirements of a false boundary of the Svensson type. A qual. explanation of the electrophoretic patterns was suggested in terms of the moving boundary theory for weak electrolytes. Nonenantio-graphic electrophoretic patterns between pH 2 and 3 amino acid buffers were also obtained with egg albumin, lysozyme, bovine γ -globulin, bovine fibrinogen, a water-soluble gelatin, and poly-L-lysine. Amino acid hydrochlorides either alone or in conjunction with a neutral salt are unsuitable as electrophoresis buffers for the examination of the heterogeneity of proteins or polyelectrolytes at low pH.

ISOLATION OF FIBRINOPEPTIDES BY CHROMATOGRAPHY. Birger Blomback and Anders Vestermarck (Karolinska Inst., Stockholm). *Arkiv Kemi* **12**, 173-82 (1958); *Chem. Abstr.* **52**, 11139 (1958). The liberation of two peptides from fibrinogen during its conversion to fibrin is described, as well as their chromatographic isolation on Dowex-50. The peptides, named A and B, have been shown to be identical with the fibrinopeptides described by Bettelheim and Bailey. The A peptide contained the N-terminal glutamyl residues split off from fibrinogen during its conversion to fibrin. Its isoelectric point is lower than pH 4, and it has an acidic net charge somewhat greater than peptide B, although peptide B seems to contain a strongly acidic sulfate group. No N-terminal amino acid residue can be found in peptide B, suggesting that this peptide has a cyclic structure or that the N-terminal residue, for some reason or other, does not react with phenylisothiocyanate under the conditions in question. The splitting off of this peptide in addition to the glutamyl peptide during the conversion process explains the finding that 2 glutamyl residues in fibrinogen are replaced by 4 glycyl residues in fibrin. Consequently, equal numbers of peptides A and B could be expected to be split off. During the conversion of fibrinogen to fibrin the 2 peptides are found to be released at different initial rates. The release of the peptide A runs parallel with the fibrin formation whereas peptide B is released at a maximum rate when the fibrin formation is slow.

DETERMINATION OF SUCCINIC, MALEIC, AND FUMARIC ACID IN THEIR MIXTURE. Z. Bellen and B. Sekowska. *Przemysl Chem.* **11**, 523-6 (1955), *Chem. Abstr.* **52**, 10806 (1958). Determine the sum of all 3 acids potentiometrically by titrating their Na salts with HClO₄ in an AcOH solution by using a glass and calomel electrode. Then determine the maleic (I) and fumaric (II) acids polarographically by using N NH₄ Cl adjusted with NH₃ to pH 8.2 as a buffer. The half-wave potential is 1.42 v. for I and 1.62 v. for II, with a Hg drop rate of 2.5 mg./sec. In case II is absent, or the sum of I and II has to be determined, the amount of all acids is determined potentiometrically, and I and II are determined with KMnO₄.

DETERMINATION OF THE MAIN CONSTITUENTS OF CRUDE PHENOL MIXTURES. L. Rappen. *Brennstoff-Chem.* **39**, 65-74 (1958), *Chem. Abstr.* **52**, 10808 (1958). The main constituents of technical phenolic mixtures are PhOH, cresols, xlenols,

2, 3, 5-trimethylphenol, and p-MeC₆H₄Et. The method is based on the m.p. of special addition compounds or mixtures with pure homologs. The method is fast and makes expensive app. unnecessary. The following complexes were used: o-cresol-lepidine, m. 78.8°; phenol-2, 5-lutidine, m. 56.7°; and the known m-cresol-urea complex.

THEORIES

THE CHEMICAL COMPOSITION OF EARTHWORM CUTICLE. M. R. Watson, *Biochem. J.* **68**, 416 (1958). Earthworm cuticles were isolated from *Lumbricus Sp* and its amino acid composition was determined by the technique of Moore and Stein on columns of Dowex 50. The analysis showed that approximately 80% of the cuticle consisted of a protein component which contained a high proportion of hydroxy proline and glycine. Hydroxy lysine which is usually present in vertebrate collagens was totally absent. The protein component was also associated with a very much larger amount of polysaccharide material than was found in the vertebrate collagens. This polysaccharide when hydrolysed yielded galactose and small amounts of both pentoses and hexosamines. There was no correlation between hydroxy proline content and shrinkage temperature as observed by Gustavson and it is therefore, suggested that it is unlikely that bonds involving specifically the hydroxyl group of hydroxy proline have a great stabilizing effect upon all collagen fibrils.

—K. T. J.

PROPERTIES OF FIBRINOGEN AND FIBRIN. Birger Blomback (Karolinska Inst., Stockholm), *Arkiv Kemi*, **12**, 99-113 (1958), *Chem. Abstr.* **52**, 11138 (1958). Some of the chemical and physicochemical properties of purified fibrinogen and fibrin are reported. The N content, the ultraviolet absorption coefficient, and the N-terminal amino acids as well as some solubility characteristics have been determined. The carbohydrate components found were galactose, mannose, glucosamine, and sialic acid. Together they constitute about 5% of the total fibrinogen and fibrin content. The procedure for the determination of fibrinogen and fibrin is given.

THE INTRAFIBRILLAR NETWORK STRUCTURE OF COLLAGEN. E. Kuhnke (Univ. Bonn., Ger.). *Naturwissenschaften* **44**, 509-10 (1957); *Chem. Abstr.* **52**, 11135 (1958). It has been found possible to cut away the electronoptically visible bands

of 640-A. period from the top and bottom of thin, contrast-rich, mounted fibers, after which very thin intrafibrillar filaments can be detected. These filaments stain strongly and are connected together in numerous places, apparently to form a 3-dimensional network. This network is embedded in a less electron-dense, unstructured mass, called at present filling substance (I). Because of the proportionately greater amount of I the network could not be shown by usual staining methods. But I apparently was loosened from the network by attaching, with thread, one end of fiber (diam. 0.5 mm.) from bovine Achilles tendon to the bottom of a water bath (about 60°) and the other end to a motor-driven eccentric which stretched and released the fibre 10 times/sec. After vibrating 1 hour, the fiber was fixed in 1% isotonic osmic acid, dehydrated in alcohol, embedded in plexiglas, and cut in an ultramicrotome, after which the network could be clearly recognized. One can assume there is a relation between the network and the micellar structure of the fibrils which causes the positive double refraction.

N-TERMINAL AND LIGHT-SCATTERING STUDIES ON FIBRINOGEN AND ITS TRANSFORMATION TO FIBRIN. Birger Blomback and Torvard C. Laurent (Karolinska Inst., Stockholm). *Arkiv Kemi*, **12**, 137-46 (1958); *Chem. Abstr.* **52**, 11138 (1958). Light-scattering measurements of fibrinogen from cattle, goat, and sheep have revealed a molecular weight of about 350,000 in all samples. The molecular weight of horse fibrinogen is found to be appreciably higher, 490,000. The pattern and rate of the polymerization of fibrinogen induced by thrombin are independent of the pH. Thus, at low pH values, 6.4, the rate of polymerization is slow in the beginning, but then suddenly increases. At higher pH values polymerization is almost rectilinear with time. At pH 6.35 and 7.4 there seems to be mainly an end-to-end-aggregation in the beginning, and at pH 9.9 a lateral aggregation also seems to occur. The effect of reptilase, the coagulating enzyme from the venom of *Bothrops jararaca*, on polymerization at pH 6.35 is essentially the same as the action of thrombin. The pH optimum for the proteolytic activity of thrombin has been shown to be between 8 and 9. The optimum for initial polymerization as measured by light scattering is somewhat lower. The coagulation time is not directly proportional to the proteolytic activity of thrombin. The optimal coagulation time under the conditions described is much lower than the optimum for proteolytic activity and initial increase in light scattering.

MECHANISM OF CHROMIC ACID OXIDATIONS. PART IV. OXIDATION OF FORMALDEHYDE BY CHROMIC ACID. A. C. Chatterji and Samir Kumar Mukherjee, *J. Amer. Chem. Soc.*, **80**, 2600 (1958). A kinetic study of the oxidation of formaldehyde with chromic acid has been made. The order of the reaction with respect to chromic acid, formaldehyde and H^+ ion has been found to be first, first and second at all hydrogen ion concentrations. The temperature coefficients for the temperature range between 25 and 55° at various concentrations have been determined. The product of the reaction, formic acid, was detected by the chromotropic acid reaction and then estimated by conductometric titration. The effect of light is negligible. The effects of some salts on the oxidation rates have been studied. The induction factor for the induced oxidation of manganous sulfate to manganese dioxide has been found to be 0.5. From a knowledge of the above results a possible mechanism for the oxidation of formaldehyde by chromic acid has been proposed.

CONTRIBUTION A L'ETUDE DES HAUTS POLYMERES PAR LA VICOSITE DES COUCHES MONOMOLECULAIRES. J. Jaffe et J. M. Loutz, *Universite libre de Bruxelles, Bruxelles, Belgique, J. of Polymer Science*, **29**, No. 120, 38 (1958). Monomolecular layer properties are tools for the investigation of molecular size, morphology, and sometimes structure. The application of the surface osmometry gives the molecular weight of some macromolecules. Several examples show an agreement with classical data obtained by other procedures. This method was applied successfully especially in the case of proteins. For synthetic macromolecules, the data are not always in agreement with the data obtained by the usual techniques; generally these data have poorer agreement for macromolecules with low rigidity. In this paper, two cases are considered: A rather rigid macromolecule and two others more or less flexible. We propose a new determination method for the molecular weight based on surface viscometry. This method supposes the transposition of Staudinger's equation in a space of two dimensions.

POLYCONDENSATIONS IN THE FORMATION OF CATECHIN TANNINS AND LIGNIN. K. Fruedenberg, *Chemisches Institut der Universitat Heidelberg, Heidelberg, Bundesrepublik, Deutschland, J. of Polymer Science*, **29**, No. 120, 433 (1958). Catechin tannins are formed by the action of protons on catechins, by condensation of the carbon atom from the ether bridge in the

2-position with one of the phenyl rings of the next molecule. As the molecule is bi-or polyfunctional, the reaction can proceed further until it ceases, on account of the low solubility of the reaction product. Lignin is formed by dehydrogenation of p-hydroxycinnamic alcohols. The radicals produced stabilize themselves by combining, giving various types of dimeric products. These, too, are phenols and by virtue of further dehydrogenation, are subjected to a mixed condensation and in part, to polymerization. In both cases, a highly irregular polymer molecule is formed from a single basic substance.

BYE PRODUCTS

TREATMENT OF GLUE AND GELATIN WITH FORMALDEHYDE. A. M. Kragh, *Mfg. Chemist* **29**, No. 3, 103-4 (1958), *Chem. Abstr.* **52**, 10622 (1958). The effects of increases in gelatin or glue concentration, HCHO concentration, temperature and pH on the reaction of HCHO with glue and gelatin were studied by mixing HCHO with solutions of various grades of glue and gelatin under a variety of conditions and observing the viscosity changes with time. Glues of low molecular weight can be cross-linked in much more concentrated solutions than high-molecular weight gelatins. Concentrated HCHO solutions reacted very rapidly with glue and gelatin; a suitable procedure was to make up the gelatin or glue solution at double the required concentration and mix equal volumes of the solution and a dilute HCHO solution. At high temperature, the cross-links were broken; the reaction was best carried out at 40-60°. At pH 4, HCHO reacted slowly with glue and gelatin, except when its concentration was very high, whereas at pH 9 the reaction was almost instantaneous. The reaction pH had to be kept at 9 for 2-3 hours to get permanent cross-linking effects. The viscosity increased rapidly when the molecular weight of the gelatin was high.

PATENTS

SUGAR-CANE-WAX ESTERS AND DIAMIDES FOR POLISHES. Commonwealth Scientific and Industrial Research Organization (Harold H. Hatt and John A. Lamberton, inventors) *Australian* **163,052**, May 26, 1955, *Chem. Abst.* **52**, 10615 (1958). Diamides or polyhydric alc. esters of acid-bleached sugar-cane wax, when compounded with paraffin wax and turpentine (or white spirit), give paste polishes of high gel strength and flow point. The esters are prepared by heating the wax and alc. with

a catalyst at 110-30° under reduced pressure. Di-(and higher) ethylene diamides are prepared by condensation of the COOH groups with the diamines at up to 200-15°. To prepare the methylenediamide, the wax is refluxed with SOCl₂, treated with NH₄OH, and condensed with HCHO in alk. alc. solution to form CONHCH₂OH groups, and then treated with diluted aqueous acid.

WAX EMULSIONS. *Badische Anilin- & Soda-Fabrik Akt.-Ges. (Karl Behringer, inventor). Ger. 908,733 Apr. 8, 1954 (Cl. 12s), Chem. Abstr. 52, 10616 (1958).* Linear polyesters (I) obtained by reaction of bivalent alcohols with dicarboxylic acids or carbonic acid show poor miscibility with normal waxes (II) and form unstable aqueous mixed emulsions. An emulsifier is prepared by alk. sapon. of the reaction product of waxlike carboxylic acids and condensation products of multivalent alcohols and high-mol. fatty acids in which most of the OH groups are esterified. When this emulsifier is mixed with I, the compositions become compatible with II, e.g., ceresin, paraffin, or beeswax, and give stable emulsions when mixed with water.

TANNING. *Badische Anilin- & Soda-Fabrik Akt.-Ges. (Eugen Immendorfer and Friedrich Holscher, inventors). Ger. 894, 301, Oct. 22, 1953 (Cl. 28a, 6). Chem. Abstr. 52, 10623 (1958).* Tanning can be carried out by aid of halides of carboxylic or sulfonic acids of high-molecular weight. Other halogen-containing compounds are suitable as well if the halogen is movable because of a double bond or a negative group. The halogen-containing compounds must react with the tanning salts to form complexes. Before and after tanning the leather is treated with salts of metals, which are able to form those complexes. The sulfochloride of phthalic acid (obtained from anhydrous phthalic acid, and chlorosulphonic acid by treating with thionyl chloride) or the sulfochloride of naphthenic acid is applied.

IMPROVEMENT OF LEATHERS. *Carl Freudenberg K.-G.a.A. Ger. 889, 349, Sept. 10, 1953 (Cl. 28a, 9) Chem. Abstr. 52, 10624 (1958).* Leathers, the grain side of which has loosened from the reticular layer, may be refastened by impregnation of the grain side. For this purpose polyesters with free OH groups are employed containing in addition cross-linking agents, such as isocyanate. The solvent is eliminated by evaporation; hot ironing improves the result. Examples are: (1) a polyester of adipic acid 3, glycerol 1, butylene glycol 3 moles; (2) an isocyanate of 3 moles methylphenylene diisocyanate and 1 mole hexanetriol; (3) a mix-

ture of 100 g polyester and 15-50 g. isocyanate with acetic ester as solvent.

MORPHOLINOALKYL VINYL ETHER POLYMERS FOR COATING LEATHER. *Paul W. McWherter, Benjamin B. Kine, and Hugo A. Alps (to Rohm & Haas Co.). U.S. 2,828,223; Mar. 25, 1958; Chem. Abstr. 52, 11452 (1958).* Improved adhesion of aqueous polymer dispersion coatings to full-grain leather or leathers containing a large amount of fatty deposits is obtained by use of a dispersion of a 3-15% of water-insoluble co-polymer of a morpholinoalkyl vinyl ether with 85-97% of a copolymerizable vinyl or acrylic derivative. Thus, a copolymer dispersion was prepared by emulsifying Et acrylate 80, Bu acrylate 15, and morpholinoethyl vinyl ether 5 in water 300 containing Na dodecyl sulfate 2 parts with 6 parts of an octylphenol-ethylene oxide condensate containing 30-50 oxyethylene units per mol. To this was added (NH₄)₂S₂O₈ 0.3, Na₂S₂O₄ 0.06, and (HOCH₂CH₂)₃N 1.0 part; polymerization caused the temperature to rise from 20 to 45°. When this polymer dispersion was pigmented and coated on a full-grain leather and dried, excellent adhesion was obtained; when a dispersion of I and II alone was prepared and coated on leather, the coating could be pulled off intact. The adhesion is still further increased if a polyisocyanate is applied to the coated leather after the aqueous morpholino polymer dispersion has dried. Use of morpholinopropyl vinyl ether is also described and claimed.

COATING OF LEATHER WITH POLYMERS CONTAINING ACRYLOYL- OR METHACRYLOYLDICYANDIAMIDE UNITS. *Benjamin B. Kine, Paul W. McWherter, and Hugo A. Alps (to Rohm & Haas Co.). U.S. 2,828,222, Mar. 25, 1958, Chem. Abstr. 52, 11454 (1958).* Suitable compounds are water-insoluble linear copolymers of monoethylenically unsaturated molecules comprising 3-50% by weight of either acryloyl- or methacryloyldicyandiamide copolymerized with at least one other polymerizable monoethylenically unsaturated monomer, such as an ester of acrylic acid or vinyl naphthalene. Thus, a dispersion was prepared by emulsifying Et acrylate 97 with acryloyldicyandiamide 3 in H₂O 300 parts containing dispersing agents. Polymerization and pigmentation were carried out as in the preceding 2 abstracts.

COATING OF LEATHER WITH POLYMERS CONTAINING UREIDO GROUPS. *Hugo A. Alps, Paul W. McWherter, and Benjamin B. Kine (to Rohm & Haas Co.). U.S. 2,828,224, Mar. 25, 1958; Chem. Abstr. 52, 11452 (1958).* Improved adhesion of aque-

ous polymer-dispersion coatings to full-grain leather or leathers containing large amounts of fatty deposits is obtained by use of a dispersion of a water-insoluble copolymer containing at least 3% units from a monomer having a structure $\text{CH}_2:\text{C}(\text{R}'')\text{YANR-CONHR}'$ where R'' is H or Me, Y is O, COO, or CONH; A is a branched or straight-chain alkylene group having 2-4 C atoms between adjoining O and N atoms or an ether-O-linked alkylene group having 2-3 C atoms; and R and R' are H, lower aliphatic groups of 1-3 C atoms or ether linked lower aliphatic groups. R may form with R' an ethylene, propylene, or trimethylene ring. The rest of the copolymer can be one or more copolymerizable vinyl or acrylic derivatives. Thus, a copolymer dispersion was prepared by emulsifying Et acrylate 80, Bu acrylate 15 and 2-ureidoisobutyl vinyl ether 5 in water 300 containing Na dodecyl sulphate 2 parts with 6 parts of an octylphenol-ethylene oxide condensate containing 30-50 oxyethylene units per mol. To the dispersion, $(\text{NH}_4)_2\text{S}_2\text{O}_8$ 0.3, $\text{Na}_2\text{S}_2\text{O}_4$ 0.06, and $(\text{HOCH}_2\text{CH}_2)_3\text{N}$ 1.0 part were added. In a 15-minutes polymerization period, the temperature rose from 20 to 45°. When this polymer dispersion was pigmented and coated on a full-grain leather and dried, excellent adhesion was obtained. The claims specify use of polymers containing N-vinyloxyethyl-N,N'-ethyleneurea, N-vinyloxyethyl-N'-ethyleneurea, N-(2-acryloyloxyethyl)-N,N'-ethyleneurea, and N-(2-methacryloylaniineothyl)-N,N'-ethyleneurea.

COATING OF LEATHER WITH POLYMERS CONTAINING HYDROXYL GROUPS. Paul W. McWherter, Benjamin B. Kine and Hugo A. Alps (to Rohm & Haas Co.) U.S. 2,828,220, Mar-25, 1958; *Chem. Abst.* 52, 11453 (1958). Compounds suitable for leather coating are water-insoluble linear polymers containing OH groups of mono-ethylenically unsaturated molecules comprising at least 3% by weight of the monomer having a structure of the general formula $\text{CH}_2:\text{CHAROH}$, where A is O or S and R is a straight- or branched chain alkylene group having 2-10 C atoms, a $\text{A}(\text{C}_2\text{H}_4)_2$, $(\text{C}_2\text{H}_4)_2\text{NR}'$, or $(\text{C}_2\text{H}_4)_2\text{N}(\text{R}'')$ R''' X group where R' is H, a Me, Et, or $\text{C}_2\text{H}_4\text{OH}$ radical; R'' and R''' are Me, Et, or $\text{C}_2\text{H}_4\text{OH}$ groups; and X is a negative radical, such as OH, Cl, Br, I, MeSO_4 , or toluene-sulphonate. Since the polymers must not be water-soluble, it is necessary to copolymerize the monomer with at least one other polymerizable monoethylenically unsaturated monomer, such as an ester of acrylic acid or vinyl naphthalene if the original homopolymer is water-soluble. The polymerizable aqueous emulsions are heated to <100° with 0.01-3.0% peroxidic free-radical

catalysts. After polymerization, a suitable pigment and a protective colloid may be added. The resulting dispersion is then swabbed on leather. Thus, Et acrylate 95 and 2-hydroxyethyl vinyl ether 5 in H_2O 300 containing Na dodecyl sulphate 2 parts and 6 parts of an ethylene oxide condensation product of an octylphenol (30-50 oxyethylene units per mol.) were dispersed. To the emulsified monomers, 0.3% by weight $(\text{NH}_4)_2\text{S}_2\text{O}_8$, 0.06% Na hydrosulphite, and 1% triethanolamine were added to catalyze the polymerization, which was carried out for 15 minutes at 20-45°. Red Fe_2O_3 9 dispersed in H_2O 14 parts with 2 parts of a dispersing agent (equal parts Na dodecyl sulphate and *tert*-octylphenoxypolyoxyethanol) plus 0.5 part of a protective colloid, e.g., methylcellulose, was added to 100 parts of a copolymer dispersion. The resulting pigmented dispersion was swabbed on full-grain upholstery leather and dried at 50°. It had excellent adhesion to the leather. Leather coated with such compounds can then be given multilayer flexible lacquer coatings.

GENERAL

PIG SKIN AND PIG LEATHER. F. Stather (*Deut. Lederinst., Freiberg, Ger.*). *Cuoio, pelli, mat. conciati*, 33, 435-42 (1957). *Chem. Abstr.* 52, 10619 (1958). Contrary to common opinion, pig skin is not very rich in fatty matter, which exists only in the subcutaneous tissues, in funnel-shaped hollows, and around the roots of the bristles; it is characteristic that 2 bulbs of bristles grow together in a unique grease papilla. The scalding of pig skin with H_2O over 55° is dangerous. It is suggested to soak 1 day at 18-20°, to unhair with lime and 4% Na_2S in a drum, and then to bate with 1% bating material for 1 hour at 36°. Hides may be Cr or vegetable tanned then fatliquored with a very small amount of grease. The bottom season, prepared with a soft synthetic wax, and the following 3-4 seasons with albumin and polymerized resins, should decrease in softness from the bottom upwards. For the manufacture of suede leather, basic Cr tanning baths without masking salts are suggested.

NOTES & NEWS

FIRST SEMINAR ON LEATHER FOOTWEAR AND LEATHER GOODS INDUSTRIES HELD AT HYDERABAD FROM JULY 31 TO AUG. 2, 1958

Technical Sessions

The regular session of the Seminar was held on the 31st July, 1958 under the chairmanship of Mr. Syed Ashfaq Husain, Development Commissioner, Small Scale Industries. On the suggestion of the Chairman, three Committees were formed to discuss the various items on the Agenda, under the following three different heads.

(i) Raw material and production; (ii) Marketing of raw material and finished products and (iii) Training and Research.

The three Committees were presided over respectively by Shri G. R. Valunekar, All India Khadi and Village Industries Commission; Mr. D. N. Tandon, The State Industrial Co-operative Association, Bombay; and Dr. Y. Nayudamma, Central Leather Research Institute. The Committees had four sessions from 31st July to 1st August, 1958 and a number of recommendations were made. The various items taken up for consideration by the Committees were:

1. Exploitation of indigenous tanning materials;
2. Supply position of raw hides and skins and their improvement in quality and use;
3. Manufacture and supply of improved tools and equipments;
4. Leather Industry as a special industry for promotion and development;
5. Establishment of separate industrial estates;
6. The State schemes;
7. Marketing of leather footwear and leather goods;
8. Exemption from Sales Tax;
9. Industrial Co-operatives;
10. Credit Facilities;

11. New units;
12. Training;
13. Research;
14. Co-ordination of training-cum-production centres, facilities centres, production centres, etc.;
15. Technical Bulletins; and
16. Research and manufacture of leather auxiliaries.

The more important of their recommendations are given below:

Planned cultivation of widely used tanning materials; prevention of indiscriminate cutting of trees and collection of ripe myrobalans; co-operation from the Forest Department in the commercial exploitation of the various indigenous tanning materials; a survey of tanning materials used in different parts of the country and their investigations; proper breeding and care of cattle during lifetime and post mortem precautions; making available a higher percentage of slaughtered hides; opening up of more flaying centres manned by qualified staff; premia for better flayed hides; greater number of common facilities centres; supply of technical knowhow to the small-scale units for manufacture of special types of leathers; detailed survey of existing indigenous units manufacturing machines and tools for the leather industry; suitable production programme; considering the leather and leather goods industry for special treatment on the lines of the handloom industry, in respect of loans, subsidy, rebates, etc; intensification of sales effort by the National Small Industries Corporation; supply of raw materials on a no-loss no-profit basis by the Corporation to approved fabricators; sending abroad of study-groups for studying fashions, tastes and demand for footwear in other countries; possibility of exporting goat skins in blue; advance of credit by State Bank of India to E.I. tanners; standardisation of training in leather technology, footwear, and leather goods; closer collaboration and co-operation between the various training institutions; research and design construction and fitting of footwear, leather goods, leather grinders and auxiliaries; research on export promotion potential, quality control and marketing; establishment of periodical on footwear and leather goods industry; efforts at producing those leather auxiliaries for which the technical knowhow was already available and the process shown to be a commercial success and stepping up research on the project of leather boards at the Central Leather Research Institute.

The closing session of the Seminar was held on 2nd August under the chairmanship of Mr. Syed Ashfaque Husain.

OUR EXPORTS TO FOREIGN COUNTRIES

Imports of hides and skins into Finland from India have been steadily improving since 1954. From 17 tons in 1954, imports in the year 1956 increased to 46 tons. The biggest demand is for Indian sheep skins. The average annual consumption of both goat and sheep skins in Finland is about 1,500 tons. Since hides and skins are on the Finnish free list, there should be no difficulty in increasing exports, with a little effort, of these items the exports of which are permitted.

The Government of Norway have also agreed to include manufactures of leather including saddlery and other harness equipment in the free list for imports from India into Norway, when the balance of payments position makes it possible for the Norwegian authorities to do so.

Denmark pursues a very liberal import policy. Amongst the Indian commodities that are admitted into that country without any quantitative restrictions are hides, skins and animal hairs.

Footwear, sports goods are subject to quantitative restrictions in Denmark.

—*Export Promotion Bulletin, Vol. I No. 18, page 15.*

CZECH VULCANIZATION PROCESS MULTIPLIES FOOTWEAR OUTPUT

In recent years the production of leather and light canvas footwear vulcanized on rubber soles has become a very popular manufacturing method in Czechoslovakia and manufacturing plants have gained a wide store of experience. Such production methods there date back to the days before World War II. The rubber soles are vulcanized to the shoe uppers in electrically-heated special steel precision molds, the temperature of which is regulated automatically.

The vulcanizing period is short, about 2 to 3 minutes, which can be set on a time registering apparatus, and makes the burning through the shoe uppers impossible, as a thermostat keeps the molds from overheating. Simple to operate, the machine requires

no manual labour, the press closing in under hydraulic action after pressing a push-button and opening again automatically after expiry of the vulcanizing period.

—*Leather and Shoes, Vol. 136, No. 3, page 26.*

YUGOSLAVIAN TRADE DELEGATION

The Three-Member Trade Delegation from Yugoslavia visited the Central Leather Research Institute on Thursday, the 28th August, 1958. They were shown round the Tannery and the various Laboratories by Dr. Y. Nayudamma, Director of the Institute.

After going round the Institute, the Delegation addressed the Technical staff of the Institute. At the outset, Dr. Y. Nayudamma welcomed and introduced the Delegation to the Staff Members. Speaking next, the Leader of the Delegation, Mr. S. Krbavac, said that although before the last World War they used to buy Indian leathers, now they were not doing so. The Delegation had come to India with a view to buy Indian leathers now on a bigger scale. They wanted to see at first hand the raw materials and semi tanned and finished leathers. It was in this connection that the co-operation of this Institute was sought by the Delegation. They were very much impressed with the work of the Institute.

The other Members of the Delegation also spoke on the occasion.

RESEARCH BEARS FRUIT

Practical Demonstration No. 7

(Second Series)

Process: Manufacture of Natural and Coloured Linings from E.I. Kips and Sheep skins.

Period: 27th October to 14th November, 1958.

Place: Central Leather Research Institute, Madras-20.

A process for the manufacture of Natural and coloured linings from E.I. kips and sheep skins, has been worked out at this Institute. It is proposed to demonstrate this process as the next in the second series of Practical Demonstrations from 27th October to 14th November, 1958.

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

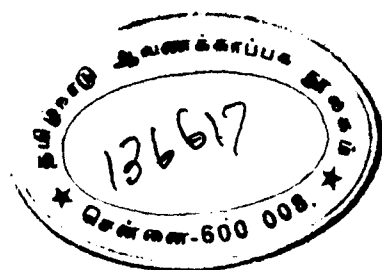
name/s of the representative/s who is/are likely to attend this demonstration. After following the process, we would request you to try this process in your Tannery and give us your valuable comments.

C. L. R. I. NEWS

1. Dr. Y. Nayudamma, Director, has undertaken a survey tour of Eluru, Vizianagaram, and the State of Orissa in connection with organisation of Extension Service Work.

2. Mr. A. Ganesan, Senior Scientific Officer, (Liaison), has undertaken a similar tour of East Punjab State.

3. Mr. N. Subramanian, Senior Scientific Officer, has rejoined duty at the Central Leather Research Institute, after completing the assignment given by the International Labour Office in Afghanistan.



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தமிழ்நாடு ஆவணக்காப்பக நூலகம்,
எழும்பூர், சென்னை-600 008.

தவணைத்தாள்.

உத. எண் :

ப. எண் :

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