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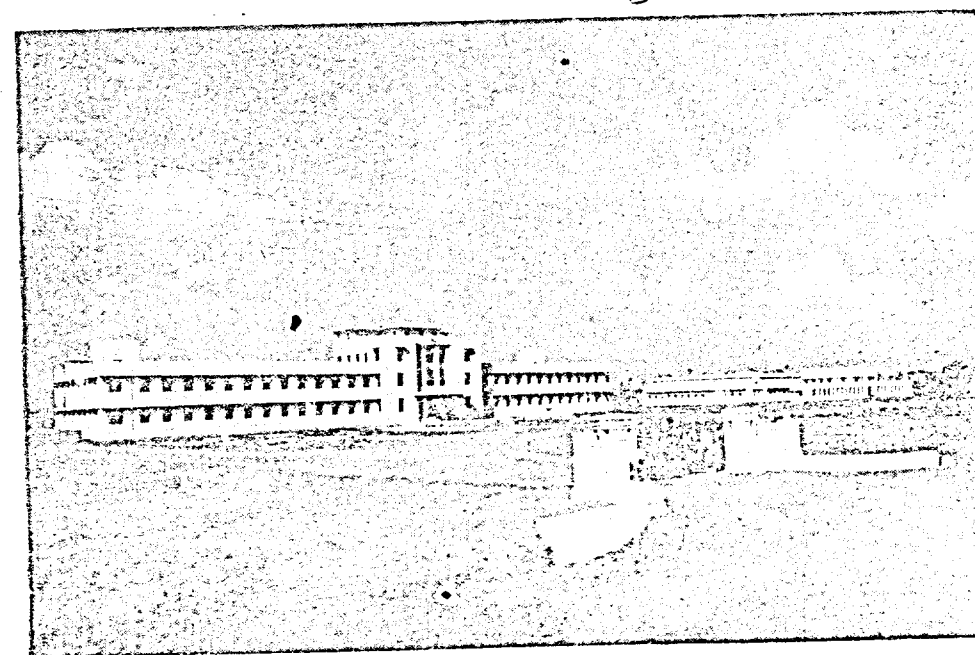
Bulletin of
The Central Leather
Research Institute
Madras



Vol. VII

JUNE, 1961

No. 11



COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH
INDIA

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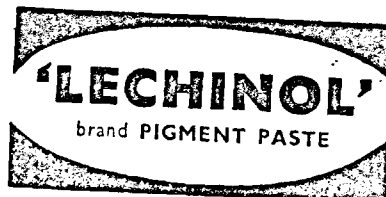
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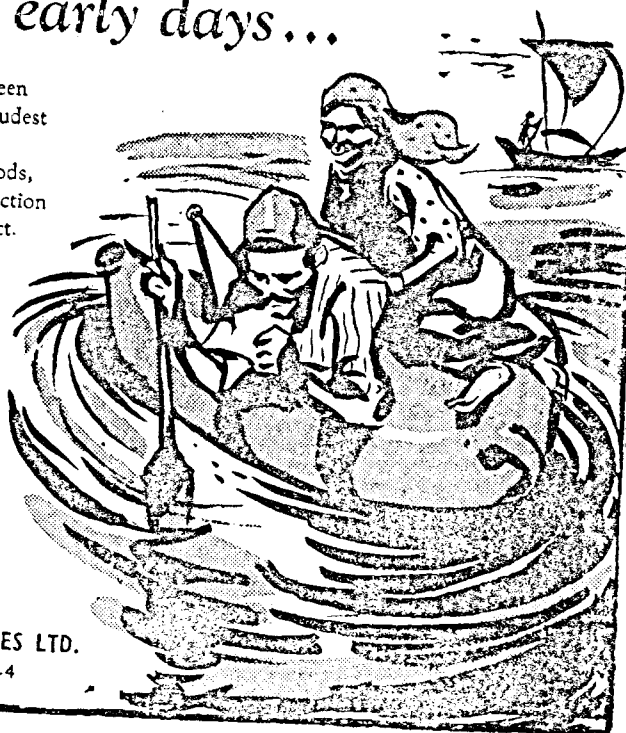
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SAUSAGE CASING (INTESTINE OF COW) AS A DIALYSING MEMBRANE FOR TAN LIQUORS

BY

P. S. SANTHANAM, K. J. SCARIA AND S. K. BARAT
Central Leather Research Institute, Madras

Received Sept. 1, 1960.

SUMMARY

Cellophane, naturin and sausage casing (intestine of cow) have been tried as membranes for dialysing myrobalan liquor. Analysis of the dialysate by electrophoresis and chromatography showed that cellophane was permeable to all the constituents of myrobalan liquor. Sausage casing was found to be permeable to the electrolytes and phenolic non-tans only and not to the tans. It is suggested that this membrane may be used with advantage for dialysis of vegetable tan liquors.

Introduction

The use of different membranes for ordinary and electro-dialysis of tan liquors has been reported by many workers. Humphreys and Douglas¹ used cellophane (0.0022 mm. thickness) for the electro-dialysis of tannin solutions and they pointed out that only molecules of molecular weight greater than 500, were retained by this membrane. Neuner and Stiasny² studied the diffusion of tannin mixtures through parchment. Their results indicated that sometimes the dialysate conformed in composition to the original undialysed mixture. Stevens and Anacker³ also used this membrane for dialysis; Cameron and McLaughlin⁴ used it for determining gallic, lactic and acetic acids. Wollenberg⁵ used naturin membrane for osmotic pressure measurements. Burton and Bickley⁶ used the same membrane for determining the natural acidity in vegetable tanning liquors. Although this membrane is now used, the search for a simpler and more suitable membrane which could be effectively used for dialysis of tan liquors is being pursued. The results of a few such dialysis experiments carried out with 'sausage casing' (intestine of cow) as a dialysing membrane are presented in this paper.

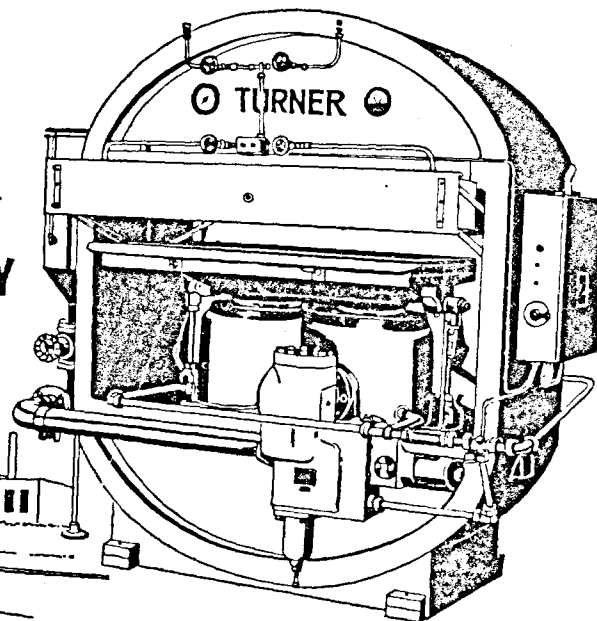


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Intestines obtained in the dry inflated form were used for these studies. These intestines which come out as a waste product in the meat industry are now being used in India for the manufacture of sausage casings and guts on a cottage scale and are very cheap. In the clean dry form they may be easily preserved for a considerable length of time.

In assessing the suitability of this membrane for dialysis experiments, a comparative study was carried out using cellophane, naturin and sausage casing as membranes. Ordinary dialysis was conducted for varying intervals using these different membranes. The dialysate and the dialysed liquor in each case were studied electrophoretically and chromatographically and from the results the suitability of each membrane was assessed. The present set of experiments is confined to myrobalan liquor only.

Experimental

The myrobalan liquor used for the studies was prepared by leaching the crushed nuts (Salem variety) with four times their weight of distilled water, in the cold, for 18 hours, the first 2 hours of the extraction being in the shaker. An exactly 50°Bk. liquor was prepared by diluting the original liquor with the necessary volume of water. The T/N.T. ratio of this liquor was determined. 70 ml. portions of this liquor were then taken in three identical thistle funnels, the wide ends of which were closed separately with one of the three membranes and kept just touching the water surface. In the course of dialysis, the T/N.T. ratio of the liquors was in each case again studied at intervals of 24, 72 and 168 hours. Duplicate experiments were carried out in all these cases in order to ensure that no errors due to leaking of membranes or bad seals to the funnels occurred. Besides the original liquor, the dialysate and the dialysed liquor were in each case examined electrophoretically and chromatographically. Electrophoretic studies were carried out using the Model No. 4937—W. 5—apparatus of Arthur Thomas and Company, with Whatman No. 3 filter paper strips in acetate buffer at a pH of 5, the papers being developed with ferric chloride-ferricyanide mixture. Chromatographic studies were made using the system, tertiary amyl alcohol: acetic acid: water in the ratio of 60:1:940, as solvent for the first dimension and water-saturated secondary butanol as solvent for the second dimension. During dialysis the dialysates were tested for tans and phenols with gelatin-salt reagent and ferric chloride-ferricyanide mixture respectively.

Results and Discussion

The T/N.T. ratios of the tan liquor after dialysis with the different membranes are given below:

TABLE I

Period of dialysis	T/N.T. ratio of liquors		
	Cellophane	Naturin	Sausage casing
0 hour	3.03	3.03	3.03
24 hours	2.33	2.48	2.48
72 hours	1.92	2.41	2.44
168 hours	1.51	1.82	35 ¹ 1.85

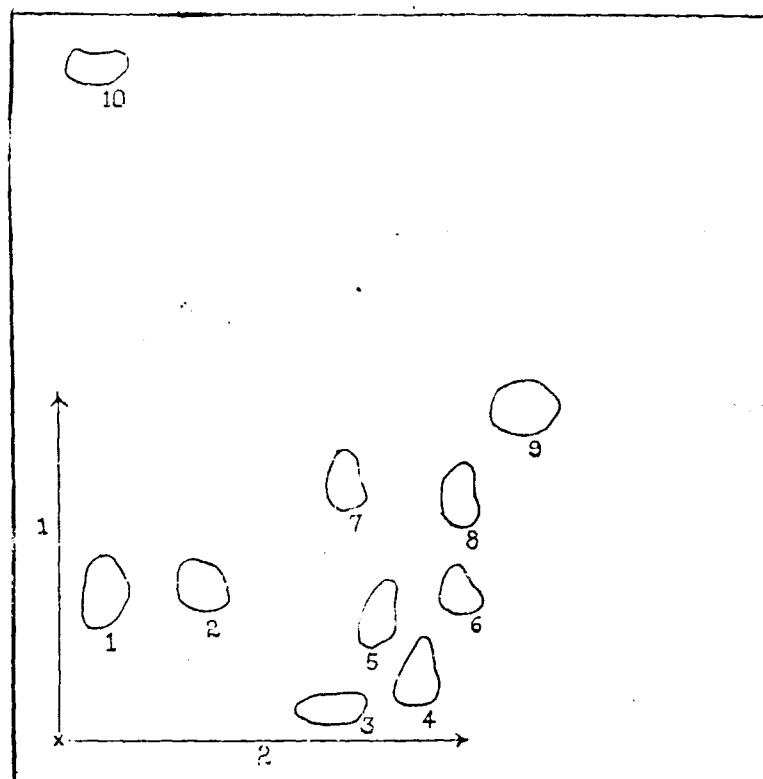
Since the results of the dialysis experiments showed a progressive decrease in the T/N.T. ratio in all the cases, it was felt that this decrease might be caused by the action of bacteria and moulds on the liquor. However, another similar series of dialysis experiments carried out with the addition of fungicides like sodium pentachlorophenate, toluene etc., also recorded a progressive decrease in T/N.T. ratio with increase in dialysing period. These results therefore suggest that the decrease in the T/N.T. ratio during dialysis is mainly due to reasons other than those associated with the bacterial or mould action. It may be due to precipitation of tans during dialysis; the precipitation may be caused by a change in the equilibrium conditions. Ordinary dialysis using a suitable membrane may not, therefore, be of much help in removing non-tans completely from myrobalan liquors.

The dialysates in all the cases answered the tests for phenols. In the case of cellophane membrane, the dialysate was found to have all the constituents present in the original liquor and gave positive test for tans even after 24 hours dialysis. But in the case of naturin and sausage casing membranes no precipitate was obtained with gelatin-salt reagent even after 24 hours and 72 hours of dialysis.

Two-dimensional paper chromatographic studies of the aqueous extract of myrobalan showed the presence of 10 different phenolic constituents which were numbered (vide Fig. 1). Chebulinic acid, chebulagic acid, gallic acid, corilagin and ellagic acid were identified by running chromatograms with model compounds and comparing the R_f values. The results of the chromatographic

studies of the dialysates using different membranes are given below:

FIG.1
PAPER CHROMATOGRAM OF AQUEOUS MYROBALAN INFUSION



NO.3 ELLAGIC ACID; NO.4. CHEBULINIC ACID; NO.5 CHEBULAGIC ACID
NO.7. CORILAGIN; NO.9. GALLIC ACID

TABLE II
Chromatographic data of dialysate

Period of dialysis	Components in the dialysate		
	Cellophane	Naturin	Sausage casing
24 hours	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9, 10	9, 10
72 hours	1, 2, 3, 4, 5, 6, 7, 8, 9, 9a, 10	9, 9a, 10, 5*	9, 9a, 10
168 hours	1, 2, 3, 4, 5, 6, 7, 8, 9, 9a, 10	9, 9a, 10, 5*	9, 9a, 10, 5*

* Intensity very faint.

It was observed from the chromatographic data that after 72 hours, the dialysate, in the case of naturin, indicated the presence of an extra spot (constituent 5 which was identified as chebulagic acid) when compared with the corresponding dialysate from sausage casing. However, since no positive test for tans could be obtained even on concentration, this was suspected to be present in trace amounts only. The other new constituent 9a common to both was identified as pyrogallol. After 168 hours, the dialysates in the case of both naturin and sausage casing gave 4 constituents with fraction 5 present in small amounts. The dialysate when concentrated and tested for tans (gelatin-salt reagent) gave a slight turbidity which confirmed that fraction 5 was a tannin constituent.

Paper strip electrophoretic studies of the aqueous extract showed the presence of as many as 7 phenolic constituents which have been numbered in the increasing order of their electrical mobility (Fig. 2). The results of the electrophoretic studies carried out with the dialysate using different membranes are given below:

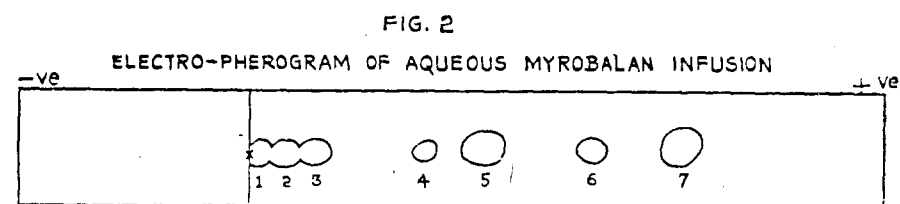


TABLE III

Electrophoretic data of dialysate

Period of dialysis	Components in the dialysate		
	Cellophane	Naturin	Sausage casing
24 hours	1, 2, 3, 4, 5, 6, 7	1, 5, 7	1, 5, 7
72 hours	1, 2, 3, 4, 5, 6, 7	1, 5, 6,* 7	1, 5, 7
168 hours	1, 2, 3, 4, 5, 6, 7	1, 5, 6,* 7	1, 5, 6,* 7

* Intensity very faint.

From the electropherograms of the dialysates, it may be seen that the dialysate in the case of cellophane membrane gave 7 spots after 24 hours dialysis, thereby showing that a considerable amount of phenolic tans was able to permeate through this membrane. Naturin and sausage casing gave only three spots after 24 hours of dialysis. After 72 hours dialysis, however, using naturin, the dialysate was found to contain one additional spot which was very faint in intensity; that using sausage casing gave 3 spots only. The dialysate after 168 hours of dialysis in both cases gave 4 spots having the same electrical mobilities. Sausage casing is considered to be more efficient than naturin as a semi-permeable membrane at least during the initial stages of dialysis (upto 3 days).

Electrophoretic and chromatographic studies carried out with the dialysates in all the three cases showed that the permeability of these membranes lay in the order cellophane > naturin > sausage casing.

A study of the two-dimensional paper chromatograms showed that cellophane was permeable to almost all the constituents of myrobalans, the dialysate in this case showing as many as 10 constituents. Naturin and sausage casing, however, gave only 3 to 4 phenolic constituents in the dialysate. The R_f values of most of these constituents corresponded to the phenolic non-tans of myrobalans. This suggests that sausage casing is permeable only to the electrolytes and phenolic non-tans and impermeable to the tannin constituents. It may, therefore, be used with advantages as a dialysing membrane.

Acknowledgement

Our thanks are due to Dr. Y. Nayudamma, Director, Central Leather Research Institute, for his keen interest in this work and for permission to publish these results.

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RESEARCH BEARS FRUIT

Manufacture of chrome retan upper leather*

BY

J. K. KHANNA AND W. N. PANDAV

Raw material:

Wet salted cow hides of weight range 9-11 kg. (20-25 lb.) of rejection quality were taken.

Soaking:

The hides were soaked for 1½ hours in plain water in a paddle. They were taken out, cut into sides, green fleshed, piled and weighed. The sides were again paddled in plain water for 1½ hours.

Liming:

(Percentages given are based on green fleshed weight).

The following chemicals were used for liming, which was carried out in a pit.

- 300% water
- 2% sodium sulphide (60%)
- 1% ammonium sulphate
- 3% slaked lime

Liming was started at about 3 p.m. The sides were handled first in sodium sulphide solution for 10 minutes and then ammonium sulphate was added; after handling the sides for another 10 minutes, slaked lime was added. The sides were handled in this liquor for 10 minutes more and left there overnight. They were handled next day twice. On the 3rd day, they were unhairied, fleshed and weighed (pelt weight).

Deliming:

The following chemicals were used for deliming:

- ¼% hydrochloric acid (commercial)

* Process demonstrated in Bombay during the period January-February, 1961.

½% C.L.R.I. Bate No. 2
150% water.

The sides were drummed with the specified quantities of acid and water for 5 minutes. The bate was then added and the sides drummed for another 30 minutes. When tested with phenolphthalein, a thin streak of pink colour was observed in a cut section from the belly.

The delimed pelts were washed twice in water and pickled.

Pickling:

The following chemicals were used for pickling:
1¼% sulphuric acid (commercial, sp. gr. 1.84)
4% salt
80% water.

The sides were drummed for 5 minutes with the specified quantity of salt and 60-70% water. The acid which was earlier dissolved in 10-20% water was then added slowly and the drum run for another 90 minutes. The pickled pelts were left overnight in the drum.

Next day, the drum was run for another 30 minutes and the pH of the bath was checked. It should be about 2.7. A section cut from the butt portion should be yellow to bromophenol blue.

Chrome tanning:

The pickled sides were drained and entered into a drum containing the following:

10% B & C chrome extract
1% sodium formate
100% water (total float).

The drum was then run for a total duration of 3½ hours, it being alternately run for 30 minutes and rested for 10 minutes.

Basification:

The sides were now basified with 2% sodium bicarbonate added in four instalments at intervals of 15 minutes. The final pH of the bath was 4.5-4.6. The sides were then taken out and piled. They were sammed and split to 1.6-1.8 mm. thickness as required and the split weight noted.

Neutralisation:

The leathers were washed in seven changes of water for 15 minutes each and then drummed with ½% sodium bicarbonate

and 150% water for 45 minutes. The sodium bicarbonate was fed in two instalments.

The leathers were left overnight in the drum. The pH of the cut section was tested. It was green to bromocresol green. The leathers were washed thrice, 15 minutes each time, the first two washes being in cold water and the third one with hot water at 60°C.

Fatliquoring:

The leathers were fatliquored in drum with one of the following compositions:

2% sulphated pungam oil (highly sulphated)
2% free fish oil
150% water at 60°C

or

4% sulphated fish oil
1.5% free fish oil
150% water at 60°C

The drum was run for 30 minutes.

Retanning:

The leathers were retanned with one of the following compositions:

10% cutch extract No. 2
10% common salt
40-50% total float.

or

10% kenmosa brand spray dried wattle extract.
40-50% total float (No salt was used).

The cutch extract was dissolved in 40% of the water (on split weight) and was fed into the drum containing the leathers in three instalments at intervals of 30 minutes. Ten minutes after each feed of the extract, dry salt was fed in the drum which was run for 1½ hours. The leathers were washed and piled.

Next day, the leathers were sammed and shaved to 1.2 or 1.5 mm. thickness as required and oiled off on the grain with the following:

¼% tallow
¼% groundnut oil
¼% sulphated pungam oil

¼% kid finishing oil
¼% kerosene oil.

The sides were set with hand and hung to dry. On the 3rd day, the sides were saw dusted. Next day, they were staked and nailed. In the evening, they were trimmed, buffed on the flesh side and snuffed on the grain side with 240 grit paper. The sides were dusted off and finished.

Finishing:

The following season was prepared:

1 part pigment paste
1.25 part Fast coating bottom "O"
0.25 part Casein 10% solution
0.10 part Carnauba wax emulsion 10%
water to make 5 parts.

1st coat:

The above season was diluted with an equal amount of water and applied with the brush and dried.

2nd coat:

The second coat was applied after adding 4 oz. of formaline per gallon (27 ml. per litre) of the season and dried. The season containing formaline was sprayed once and dried.

Top fixing:

1. { 500 cc. casein 10% solution
1000 cc. water
250 cc. formaline
250 cc. water.

The above two seasons were mixed, sprayed and dried. The leathers were plain plated,

or

2. C.L.R.I. glossy top was sprayed, dried in sun for ½ hour and plain plated.

[Wherever a paste drying unit is available, the following method is found to give satisfactory results.

After retanning with either cutch or kenmosa extract, the leathers are shaved to required thickness and refatliquored with the following:

1½% sulphated fish oil
½% free fish oil

½% kid finishing oil
¼% tallow
½% kerosene oil
100% water.

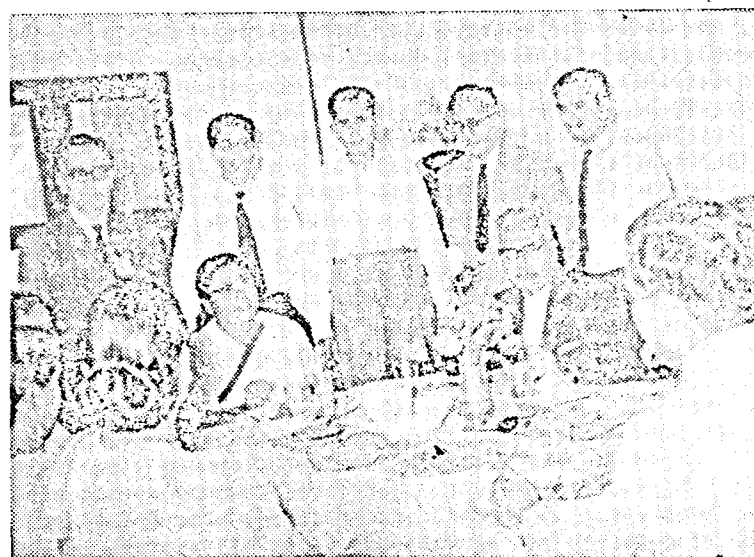
The drum is run for 30 minutes.

The leathers are set and the paste is applied on the grain side.

The paste is made up as follows:

3.5 lb. (1.59 kg.) wheat flour.
1.75 lb. (0.79 kg.) soluble starch
1.25 lb. (0.57 kg.) sulphated fish oil
10 lb. (4.54 kg.) water.

The sides are pasted on the glass plate with the help of a slicker. The leathers are dried at a temperature of 40-42°C and relative humidity of 53%, for about 6 hours. When dried, the sides are removed, buffed on flesh side and snuffed on grain side and finished. By this process, the saw-dusting, staking, toggling and nailing can be avoided. The leather obtained is flat and uniform in substance. The tightness and break are better as compared to the other process mentioned above. The dried leathers are finished as described earlier].



A photo taken on the occasion of the 3rd meeting of the Leather Development Council, at Agra (*vide Bull. C.L.R.I.*, 7, 503). Seated at the table, facing the camera are Mrs. Sucheta Kripalani, Minister for Labour & Industries, U.P., who inaugurated the meeting and Shri M. L. Khaitan, Chairman of the Council.

TECHNICAL SEMINAR

Stability constant measurement using radioactive tracers*

BY

D. RAMASWAMY

[The speaker was sent to U.K. under the Colombo Plan for higher training in the field of "Radioactive tracer techniques and metal complex chemistry." He worked in the Radiochemistry Department, University of Durham.]

The development of ionic equilibrium in solution and the concept of stepwise formation of complexes as originated by Bjerrum was considered in relation to the complex formation and the species present in solution. The measurement of stability constants, as accurately as possible, the importance of this constant in analysis and other chemical fields and the various methods of determination were also briefly dealt with. The method of determination based on ion exchange wherein the concentration of metal ion distributed between the resin phase and the solution phase as measured through radio tracer metal ions was dealt with particular reference to rare earth metal ions and hydroxyacids as complexing agents. The various factors like pH, concentration of foreign cations, rate of absorption etc. that influence the accuracy obtained with this method were discussed. The simple method of treatment and calculation as derived by Schubert, the limitations in this treatment and the degree of accuracy in computing stability constant were dealt with according to this treatment. The results obtained with yttrium and cerium metal ions using lactic acid and α -hydroxyisobutyric acid as chelating agents were presented and the difficulties in computing stepwise stability constants according to Schubert's treatment was indicated. However, fairly accurate overall stability constants could be obtained with certain limitations and assumptions in favourable cases.

The various approaches developed for overcoming the limitations of the simple procedure were discussed and the most rigorous method as developed by the Swedish school was described in

* Summary of talks given on March 1 and May 12, 1961.

details; the method of calculation and treatment with all the refinements for determining stepwise stability constants was dealt with. The experimental procedure was gone through with particular emphasis on handling tracers in the absence of carriers. The difficulties encountered in adoption of their method as such were indicated together with the improvements and modifications in order to overcome them. The constants obtained by following the modified procedure employing cation exchange resin in presence of tracers were:

	β_1	β_2	β_3
Cerium lactate system	225	1.136×10^4	1.0×10^5
Cerium α -hydroxyisobutyrate system	246	1.258×10^4	1.5×10^5

where β_1 and β_2 and β_3 represent overall stability constants, when 1, 2 and 3 complexes are present in solution.

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Senor Moreno Sanchez, President of the Mexican Senate (third from left) and party, who visited the C.L.R.I. on May 10, 1961.

TECHNICAL SEMINAR

Study of the U.K. leather industry*

BY

S. N. BOSE

[The speaker was sent on deputation to U.K. for training in leather technology under the Colombo Plan. During his stay there, he visited the following centres: (1) National Leather Sellers' College, London; (2) Messrs. Earnshaw at Bishops Stafford; (3) Messrs. Imperial Chemical Industries, Ltd.; (4) Messrs. Nene Finishes.]

At the National Leather Sellers' College in London, experiments were carried out to evolve a suitable technique for the manufacture of diaphragm leather, gas meter leather and chrome retan-polysulphide liquid polymer impregnated oil seal leather. The manufacture of belting leathers, hydraulic leathers etc. also was studied.

The stay at Messrs. Earnshaw's at Bishops Stafford, was utilised for studying the processes of finishing chrome retan upper leathers in various fancy pastel shades including giving the pearlised effects in leathers.

In the laboratory of Messrs. Imperial Chemical Industries Ltd., the procedure for finishing chrome retan upper leathers, upholstery leathers, flesh splits etc. with the vulcaprene finish under development there, was studied as also the processes of finishing leathers into metallic finish of great brilliance in various shades of different metallic colours such as silver, gold, copper, brass, gun metal etc.

At Messrs. Nene Finishes, finishing leathers in various shades of fluorescent colours was specialised in, and about 200 shade cards for the different proportions of various pigments of all ranges of shades were prepared.

* Summary of talk given on April 14, 1961.

TECHNICAL SEMINAR

Leather industry in Ceylon*

BY

R. SELVARANGAN

[Dr. R. Selvarangan was on an assignment for one year, as Leather Technologist under the Colombo Plan, at the D. I. Leather Products Corporation, Colombo.]

In Ceylon, there are 15 tanneries in the outskirts of Colombo and one in Kandy. Of these, only the D.I. Leather Products Corporation at Mattakuliya in Colombo, is manufacturing chrome tanned leather. Necessary technical assistance has been given to this tannery in improving the quality and quantity of the chrome uppers manufactured therein. The factors contributing to looseness of grain in chrome uppers manufactured here, were studied and remedies suggested.

Manufacture of sole leather from Ceylon buffalo hides by rapid vegetable tannage, E.I. tanned kips and vegetable tanned insoles by modified process, lining leather from chrome splits, lace leather from vegetable tanned sides were introduced. Chrome tanning heavy goat skins and buffalo hides and semichroming E.I. kips also were introduced. Necessary steps were taken to standardise and increase the production and to reduce the cost of production.

Ways and means were suggested to make the best use of the available space, men, material and machinery in the tannery and also for the better utilisation of the by-products of this industry. Necessary schemes were also given for the development of the tanning industry in Ceylon.

The difficulties experienced in rendering technical assistance to a commercial tannery and the maxim to be followed in carrying out this type of work successfully were also pointed out.

* Summary of talk given on May 5, 1961.

CLASSIFIED ABSTRACTS

RAW MATERIALS

A study of a *Clostridium* bacterium that causes severe hide damage.

Jean J. Tancous (Depart. of Basic Science in Tanning Research, Tanners' Council Research Lab., Univ. of Cincinnati, Cincinnati 21, Ohio) *J. Am. Leather Chemists Assoc.* **56**, 106-122 (1961). A bacterium taken from salt-cured hide samples having severe grain damage has been isolated and identified as a probable strain of *Clostridium capitolale*. This bacterium is able to tolerate upto 8% salt, and its resistant spore is able to lie dormant in dirty salt and in hide even after liming. It causes severe damage to hides in a pack and can completely digest corium collagen samples in test tube trials. The enzyme that this bacterium produces has been isolated, and its pH and temperature requirements for digesting native collagen are comparable to those of the collagenase of *Clostridium histolyticum*. The biochemical and morphological characteristics indicate that this bacterium is not *Cl. histolyticum*.

PROCESSES PRIOR TO TANNING

Gelatin degradation by microbial and other enzymes as related to their unhairing activity.

H. W. Jones, T. C. Cordon, J. Naghski, and W. Windus (Eastern Regional Research Laboratory, Philadelphia 18, Pennsylvania) *J. Am. Leather Chemists Assoc.* **56**, 123-131 (1961). A study of the enzymatic depilation of cattlehide would be aided materially if an assay method could be found which correlated with hair-loosening action. Enzymes from bacteria, fungi, plants, and animals were evaluated according to their action on gelatin as measured by formol titration, decrease in viscosity, and liquefaction. Although the correlation between these assay methods and the degree of hair loosening was statistically significant, the magnitude of the relationship was not great enough to permit dependable predictions.

OTHER TANNAGES

Amine compounds of the transition elements. Part V: The reaction of zirconium(IV) chloride with some aliphatic amines.

J. E. Drake and G. W. A. Fowles, (University of Southampton) *J. Chem. Soc.* 1498 (1960). Zirconium (IV) chloride forms simple adducts with a number of secondary and tertiary aliphatic amines, but aminolysis takes place with primary amines. The following aminobasic zirconium (IV) chlorides have been isolated: $ZrCl_2(NHMe)_2$, NH_2Me , and $ZrCl_3(NHR)$, NH_2R ($R = Et, Pr^n$, and Bu^n). The mechanism of the reactions and the probable structures of the products are discussed.

PROCESS AFTER TANNING

The theory of heat and moisture transfer as related to the drying process.*

G. King, (Wool Industries R. A., Leeds) *via Leather Trades Review* **139**, 426 (1961). Henry's theoretical solution of the problem of drying in porous materials is considered and evidence in support of this theory is summarised.

Experimental results for the movement of vapour through felt discs and measurement of drying rates for the same discs are discussed. Further consideration is given of the effects of air-speed and temperature change; finally values are obtained for the diffusion coefficient for water vapour (using felt discs) and in all these cases, the experimental evidence is found to support Henry's theory.

Movement of fluids in permeable media.*

R. M. Barrer, (Imperial College of Science and Technology) *via Leather Trades Review* **139**, 426 (1961). The differential equation of transport of fluids in porous media has been developed and discussed. Special attention is paid to Darcy's law in both steady and transient states for the description of the movement of a homogeneous fluid in pore spaces.

As the amount of fluid withdrawn from a saturated porous medium increases, two-phase flow develops. This situation can also be described by Darcy's equation and in terms of the force-potential of Hubbert; the treatment of imbibition of liquids by filter paper due to Fujita is also outlined.

The final stage of drying fibrous masses involves diffusion of dissolved water within the organic substance and of water vapour in air spaces.

The movement of moisture and vapour during the falling rate period of drying textile materials*

J. W. Bell, (Derby Technical College) and P. Grosberg, (Leeds University) *via Leather Trades Review* 139, 426 (1961). It is shown that during the falling rate period of drying, textile structures consist of a central core containing liquid water, the outer layers being dry. Vapour diffuses from this core at a rate governed by heat transmission to it. By balancing these two rates one can calculate the temperature within the body. It is further found that the position of the core surface is determined solely by the conditions within the core. From an analysis, the position of the core boundary is then accurately predicted. Knowing the temperature and position of the core boundary the falling rate drying curve can be predicted. The critical moisture content must still be known.

The effect of drying on the water uptake of chrome tanned hide-powder.*

D. Greaves (British Cellophane, Ltd., Bridgwater) *via Leather Trades Review* 139, 427 (1961). The introduction considers the general position today of theories explaining the water-holding properties of collagen fibres both before and after tanning. Experimental methods employed to investigate further the particular case of hide-powder are described. The methods depend on the use of a sintered glass plate to support a fibre mat and weights of the mat at equilibrium under various hydrostatic pressures are recorded.

Comparison of water uptake has been made between various tannages and between samples dried under differing conditions; the influence of lyotropic and stripping agents is also considered.

The results are consistent with changes effected in the chromium cross-links during drying rather than in an increase in their number.

The practice of paste-drying upper leather.*

H. S. Stebbing, (Barrow, Hepburn and Gale Ltd., London) *via Leather Trades Review* 139, 427 (1961). The advantages of paste-drying are mainly economic and include improved quality of the grain, elimination of shrinkage during drying and a saving of both time and labour. The particular problems of the proce-

dures are discussed and methods employed in actual practice to eliminate trouble are explained and summarised.

Freeze-drying as a means of minimising fibre collapse in collagen matrices.*

H. S. Edgecombe, S. R. Evelyn and R. Sykes, (Leather Industries Research Institute, S. Africa) *via Leather Trades Review* 139, 427 (1961). After introducing the problems of retanning fibrous structure of fresh hides and skins in durable articles, attention is paid to methods of preventing fibre collapse during dehydration.

Details of experimental work using pilot plants for freeze-drying at atmospheric and reduced pressures are described. The higher capital cost of vacuum type equipment tends to be balanced by reduced drying time. Possible applications of freeze-drying in the leather industry are discussed and several innovations put forward.

The practical problems of drying gelatine.*

C. F. C. Simeons, (British Gelatine Works Ltd., Luton) *via Leather Trades Review* 139, 427 (1961). Two methods used traditionally in the industry are briefly described and some explanation given of recent modifications, including chilling and extrusion under pressure, leading to the development of a belt system operating in a tunnel under very carefully controlled conditions; each of these innovations gave rise to its own problems and these are discussed in turn.

Further experiments in leather drying*

F. E. Humphreys, (B.L.M.R.A., Egham) *via Leather Trades Review* 139, 427 (1961). A survey is given of the work which has been carried out at the B.L.M.R.A. on the development of tunnel drying for sole leather and a method of calculating the operational characteristics of the tunnel is explained.

The operation of the pilot plant, controlled at specified wet-bulb depression, is outlined and performance tables are quoted. Further experiments involving modification of this technique, suited to the special requirements—e.g., by adapting it for paste-drying, and also by considerably increasing drying rates—of chrome side and various types of light leathers are recorded and results so obtained are discussed, with special reference to shrinkage, in terms of the moisture holding properties of the fibres.

* Abstracts of papers presented at the Society of Leather Trades Chemists symposium held in March, 1961 at Cambridge.

TESTING

The correlation of separating power and efficiency of gas-chromatographic columns.

J. H. Purnell, (Department of Physical Chemistry, University Chemical Laboratory, Lensfield Road, Cambridge) *J. Chem. Soc.* 1268 (1960). A new measure of gas-chromatographic column efficiency, the separation factor S , is proposed and defined. Methods of calculating its value, both empirically from elution curves and from relative volatility data, are described. A general equation relating theoretical-plate requirements with relative volatility, retention volume, and free space in the column is derived. This equation is used to explain inconsistencies in the apparent separating power of different columns, in particular, for capillary and packed columns. Application of the equation to prediction of experimental efficiency requirements, with consequent elimination of much experimental work, is discussed.

Correlation of polarographic data with structure. Use of the Hammett-Taft relation.

Philip J. Elving and Joseph M. Markowitz (Department of Chemistry, University of Michigan) *J. Org. Chem.* 25, 18 (1960). The success which the Hammett polar substituent relation has had in correlating the polarographic half-wave potential data of certain series of organic compounds with their structure, prompted an examination of the applicability of the Taft elaboration on the Hammett relation for the same purpose. The Taft-Hammett equation very satisfactorily correlates data in the electrochemical reduction of a variety of functional groups in both aliphatic and aromatic compounds. In the case of aliphatic compounds, the equation is apparently not applicable for substituents larger than ethyl groups.

Labelling fatty acids by exposure to tritium gas. II. Methyl oleate and linoleate.

E. P. Jones, L. H. Mason, H. J. Dutton and R. F. Nystrom (University of Illinois) *J. Org. Chem.* 25, 1413 (1960). Unsaturated fatty acid esters react at room temperature on exposure to gaseous tritium by addition of tritium to a double bond and with little or no substitution of tritium for hydrogen. Evidence for addition to olefinic bonds, rather than substitution for hydrogen, has been obtained from gas-liquid and liquid-partition chromatography of both the tritiated fatty acids and the tritiated products

after mild oxidative cleavage. Tritiated fatty acid esters appear on chromatograms at positions of the next less-saturated member of the isologous series. The position of addition of the tritium is deduced from the radio-activity of the monobasic and dibasic acids produced by oxidation.

Transport of non-electrolytes through ion-selective membranes by electro-osmosis.

J. W. Jarvis and F. L. Tye (The Permutit Co. Ltd., Gunnersbury Avenue, Chiswick, London, W. 4), *J. Chem. Soc.* 620 (1960). Removal of sodium chloride from aqueous solutions of D-glucose and glycerol by electrodialysis through Permaplex C-10 and A-10 ion-selective membranes is accompanied by transport of some non-electrolyte through the membranes. At current densities of $> 10 \text{ mA/cm}^2$ the transport of non-electrolyte is almost entirely due to electro-osmosis; at lower densities, provided reverse osmotic flow is small, the transport of non-electrolytes per faraday is larger owing to an increased contribution from diffusion.

An equation expressing total transport in terms of electro-osmosis and diffusion is deduced, whence it follows that the transport of non-electrolyte by electro-osmosis depends only on the concentration of the non-electrolyte in the solution donating the counter-ions to the membrane. Further, the percentage loss of non-electrolyte during electrodialytic desalting is shown to be independent of the non-electrolyte concentration but dependent on the reduction in salt concentration.

Comparison of the quantities of D-glucose and water transported by electro-osmosis with those present in the donating solution shows that water is transported preferentially.

Spectroscopic studies of phenols: Effect of substituents on hydrogen bonding.

N. A. Puttnam, (Queen Mary College, London, E. 1) *J. Chem. Soc.* 486 (1960). The hindering effect of various alkyl groups on the formation of hydrogen bonds in phenols has been studied. It has been shown that alkyl groups, except t-butyl, in *ortho*-substituted phenols have only a slight effect on the formation of hydrogen bonds, while in di-*ortho*-substituted phenols the effects are more pronounced. The greater the hindering effect of an alkyl group, the more formation of associated states is suppressed.

Radiation chemistry of carbohydrates. Part IV: The effect of gamma-radiation on aqueous solution of sucrose.

G. O. Phillips and G. J. Moody, (University College, Cathays Park, Cardiff) *J. Chem. Soc.* 762 (1960). Yield-dose curves obtained from isotope dilution and paper chromatographic methods reveal that glucose and fructose are primary products of γ -irradiation of aqueous sucrose solutions, together with smaller amounts of gluconone and gluconic acid. Glucuronic acid, 2-oxogluconic acid, arabinose, and two- and three-carbon aldehydic fragments arise in secondary processes. In the final stages carbon dioxide and formic acid are formed. Hydrogen peroxide is produced continuously.

The amounts of volatile and non-volatile acid formed, and changes in optical rotation and absorption spectra, were determined. Thus, the degradation of sucrose is related to two types of oxidative scission of the disaccharide linkage.

Infrared spectra of lignin and related compounds. II. Conifer lignin and model compounds.

Herbert L. Hergert (Olympic Research Division, Rayonier Inc.) *J. Org. Chem.* 25, 405 (1960). The infrared spectra of conifer lignin model compounds and degradation products were determined, and characteristic frequencies of carbonyl groups, ethylenic bonds, aromatic rings, and hydroxyl groups are presented. These results are applied to lignins isolated from five different coniferous genera. The functional groups occurring in the lignin molecule are discussed and related to the mode of isolation.

Mannich reaction mechanisms.

Thomas F. Cummings and J. Reid Shelton (Department of Chemistry and Chemical Engineering, Case Institute of Technology), *J. Org. Chem.* 25, 419 (1960). A modified method for following the course of the Mannich reaction is described which makes it possible to analyze for formaldehyde in the presence of aldehydes or ketones. Kinetic data on the reaction between cyclohexanone, dimethylamine, and formaldehyde are presented, and mechanisms consistent with the data are proposed. Different mechanisms are indicated for acidic and basic media. Complex combinations of mechanisms appear to take place at intermediate pH values. The base-catalyzed reaction appears to involve the reaction of a carbanion (derived from the active hydrogen compound) with the amino-methylol by an S_N2 mechanism. The rate increases at higher pH values. The reaction in acid media appears to involve the reaction of a carbonium ion (derived from the aminomethylol) with the active hydro-

gen compound. The rate is slower than for the reaction in basic media and is independent of pH values.

On the correlation of hydrogen bridging equilibria with acidity.

John E. Gordon (Mellon Institute), *J. Org. Chem.* 26, 738 (1961). The relationship $\Delta \log K_{\text{assn}} = a \Delta \log K_a^{\text{HA}}$ is proposed for correlation of hydrogen bridging equilibria with acidity in the system variable acid-reference base: $\text{HA} + \text{B} \xrightleftharpoons{K_{\text{assn}}} \text{AH} \cdots \text{B}$. The

available chemical and spectroscopic data are found to be largely in accord with this and the analogous expression for variation of the proton acceptor moiety. Analogous expressions are found applicable to formation of the bridged ion pair, $\text{A}^- \cdots \text{HB}^+$, and on inclusion of the Brønsted catalysis law, the formation of each of the species ($\text{AH} \cdots \text{B}$, proton transfer transition state, $\text{A}^- \cdots \text{HB}^+$) intermediate between $\text{AH} + \text{B}$ and $\text{A}^- + \text{BH}^+$ can be described by $\Delta \log K = x \Delta \log K_{\text{t,n}}$ with suitable coefficient x . Numerical results of the correlations are compared and related to structure using this model, as are the formation of complex ions of the type $\text{BHB}^\pm$ and the influence of proton acceptor polarizability on hydrogen bridge stability.

Detection and estimation of fungal amylases in flour.

R. A. Knight, *J. Sci. Food Agric.* 11, 54 (1960). As the methods normally used in the examination of flour do not reveal the presence of fungal amylases, a technique has been developed which may be employed for their detection and semi-quantitative estimation. This is based on the decrease in α -amylase activity which occurs when a flour extract containing calcium ions is heated at 68° for 30 minutes. Confirmation of the presence of fungal amylase and of the amount which has been added to flour can be obtained by using the relationship between cereal α -amylase activity and Hagberg number.

A method for the microdetermination of lower aliphatic fatty acids by paper chromatography and its application to study of the metabolism of *Ascaris lumbricoides* var. suis.

Yoshio Ueno (Dept. of Pharmacology, Faculty of Medicine, Univ. of Tokyo, Tokyo) *J. Biochem.* 48, 161 (1960). A new sensitive method for determination of lower fatty acids based on Feigl's principles is reported. The method consists of the following sequences: (a) The separation of acyl-hydroxamic acids by paper chromatography. (b) Oxidation of hydroxylamine by iodine to nitrous acid. (c) Coupling of diazotized sulfanilic acid with α -naphthylamine to form stable red azo dyestuff. The method has

a lower limit of 0.5 µg. per ml. of fatty acid in solution. This new method was applied to analyze volatile fatty acids in *Ascaris*.

THEORIES

Biochemical studies on the formation of the silkprotein. VII. The conversion of glycine to serine in the silkworm larva.

Toshifumi Fukuda, (Sericultural Experiment Station) *J. Biochem.* 47, 720 (1960). To clarify the conversion of glycine to serine in the silkworm, glycine-1-C¹⁴ and glycine-2-C¹⁴ was given *per os* to the silkworms, and then serine was isolated from the fibroin and the sericin produced by these silkworms. The serine had a comparatively high radioactivity in its molecule. The carbon of the carboxyl group and the carbon-2 atom of glycine are respectively used for synthesis of the carbon of the carboxylic group and the carbon-2 and -3 atom of serine in the silkworm. It was found that glycine is converted to glyoxylic acid in the silkworm by clarifying the existence of radioactivity in the glyoxylic acid which was isolated from the body fluid of the silkworms to which glycine-1-C¹⁴ was given *per os*. These facts seem to suggest that serine which is contained in comparatively high amount in fibroin (15 per cent) and in sericin (30 per cent) is derived not only directly from the serine in the mulberry leaves eaten by silkworm, but also from the serine which was synthesised from the glycine in the silkworm body.

Biochemical studies on the formation of the silkprotein. VIII. The synthesis of α-ketoglutaric acid, oxalacetic acid, and glyoxylic acid from glucose in the silkworm.

Toshifumi Fukuda & Toshio Hayashi (Sericultural Experiment Station) *J. Biochem.* 48, 9 (1960). The current work was carried out, using C¹⁴ glucose, to examine whether α-ketoglutaric acid, oxalacetic acid, and glyoxylic acid are synthesised from the glucose in the silkworm. Three kinds of keto acid were respectively isolated from the body fluid of silkworms which consumed C¹⁴ glucose, as their 2, 4-dinitrophenylhydrazones, and their radioactivities were measured. High radioactivity was recognised in α-ketoglutaric acid and in oxalacetic acid, but the radioactivity of glyoxylic acid was extremely low, showing that glucose is not a direct precursor for glyoxylic acid. It seems to be doubtful that the formation of glyoxylic acid from glucose is the main pathway for glyoxylic acid synthesis.

Studies on lipoprotein lipase. I. Determination of lipoprotein lipase.

Masaya Suehiro & Kazuo Nakanishi (Takamine Laboratory, Sankyo Co. Ltd., Tokyo) *J. Biochem.* 47, 777 (1960). A modified

method for the quantitative assay of lipoprotein lipase based on the determination of glycerol has been presented. After the deproteinization of enzymatic reaction mixture with trichloro-acetic acid, the filtrate obtained was oxidised with periodate and the resulting formaldehyde was coloured with chromotropic acid without disturbance.

Turnip peroxidase. II. The reaction mechanisms of turnip peroxidases A₁, A₂ and D.

Toichiro Hosoya (Chemical Institute, College of General Education, Univ. of Tokyo, Tokyo) *J. Biochem.* 74, 794 (1960). The kinetics of the overall reaction of the purified turnip peroxidases A₁, A₂ and D has been studied using guaiacol and ascorbic acid as the hydrogen donor. The reaction mechanisms of these enzymes were found to be essentially of the same nature as each other and as that of horseradish peroxidase, but the relationship between the reciprocal of the rate of overall reaction and the reciprocals of the concentrations of hydrogen donor was different from that for horseradish peroxidase, only in that there is an additional absolute term (independent of the concentrations of hydrogen peroxide and hydrogen donor) in the case of the enzymes here studied. This term was interpreted by two probable mechanisms, and the values of the rate constant of each reaction step were computed and compared with that of horseradish peroxidase.

Incorporation of amino acids into protein of *Pseudomonas* cell fractions.

Hiromi Mutsui & Etsuko Yoshida (Division of Enzymology, Insti. of Applied Microbiology, Univ. of Tokyo, Tokyo) *J. Biochem.* 48, 242 (1960). Cell fractions were prepared from *Pseudomonas*-P by sonic disintegration and differential centrifugation. These fractions were composed of large particles, sedimentable at low speed centrifugation (20,000xg), small particles, sedimented at 105,000xg, and the soluble fraction. Chemical, ultracentrifugal and electrophoretic analysis gave some characteristics of each fraction. Both *in vivo* and *in vitro* experiments showed that the rate of amino acid incorporation into the particulate fractions was much higher than in the soluble fraction. The acidity of the particulate fraction was markedly inhibited by the soluble fraction. A 'Ghost' fraction and a cytoplasmic supernate were obtained by lysozyme treatment in hypertonic medium and subsequent osmotic shock of the protoplasts. These two fractions incorpo-

rated amino acid at the same rate *in vivo*. The role of the particulate fraction of *Pseudomonad* cells was discussed.

Studies on bacterial amylase. IV. On the C-terminal region of bacterial amylase.

Kin-Ishi- Sugae (Laboratory of Biochem., Faculty of Sci., Osaka Univ., Osaka) *J. Biochem.* 48, 397 (1960). The C-terminal amino acid of BA *B. subtilis* N^o) was analysed by hydrazinolysis and by the use of carboxypeptidase. From the results of hydrazinolysis, it was suggested that C-terminus of BA might be glycine. While, a considerable amount of amino acid was released by the action of carboxypeptidase on native bacterial amylase and no decrease of the amylase activity was observed. Amino acids liberated by carboxypeptidase are leucine and/or isoleucine, valine, phenylalanine, alanine, acidic amino acids, tyrosine, threonine, serine, asparagine and glycine. In contrast to the case of hydrazinolysis, it is remarkable that leucine, valine and phenylalanine are liberated in much larger amounts as compared to that of glycine. No clear cut result was obtained about the nature of C-terminal group of BA. However, it might be suggested that C-terminus of BA is not essential for the enzymatic activity.

Condensation products of ethylenediamine with catechol derivatives.

Kunio Yagi & Toshiharu Nagatsu (Dept. of Biochem., School of Medicine, Nagoya Univ., Nagoya) *J. Biochem.* 48, 439 (1960). The condensation products of ethylenediamine with various catechol derivatives were studied. The main condensates of adrenaline, noradrenaline, dopamine and dopa could be separated by paper chromatography or by paper electrophoresis. Absorption and fluorescence spectra and pH-fluorescence curves of these substances were different from each other. These properties can be used for identification of catechol derivatives. During the condensation reaction with ethylenediamine, adrenaline gives the main condensation product of noradrenaline and ethylenediamine as its side product. The main condensate of noradrenaline was found to be identical with that of 3,4-dihydroxymandelic acid or catechol. This might be important to consider the specificity of ethylenediamine method in the fluorimetric determination of catechol derivatives of biological importance.

A proteolytic enzyme of *Streptomyces griseus*. V. Protective effect of calcium ion on the stability of protease.

Masao Nomoto, Yoshiko Narahashi & Mitsuru Murakami (Inst. of Phy. & Chem. Res., Tokyo) *J. Biochem.* 48, 453 (1960).

Calcium ion acts as an essential factor for stabilising *Streptomyces griseus* protease. Under conditions in which calcium ion is deficient, the enzyme was readily inactivated by the procedures of dialysis, salting out, ion-exchange resin column treatment, or heating. It was found, however, that the enzyme was highly protected from inactivation by the presence of a small amount of calcium ion during the above mentioned procedures. The enzyme was also inactivated irreversibly by mixing it with EDTA. It seems that the active configuration of the enzyme can be maintained and denaturation prevented by combining the enzyme with calcium ion. Strontium ion also proved capable of serving as a protective ion, but not other metal ions.

In connection with the above investigations, it was found that the enzyme was adsorbed on and eluted from the cation exchange resin column in which the functional group of resin was prepared in the state of calcium form, in a good yield. This information seems to indicate that calcium ion is not only the stabilising factor of the enzyme but also the medium of enzyme-resin complex formation in resin column treatment.

BYE-PRODUCTS

The amino-acid composition of processed bones and meat.

J. E. Eastoe & Joan E. Long, *J. Sci. Food Agric.* 11, 87 (1960). Quantitative amino-acid analyses were made by ion-exchange chromatography on two samples of commercial feeding meals containing high contents of meat and bone respectively, after processing in an Iwel-cooker and acid hydrolysis. The processed bones had an amino-acid composition close to that of collagen with slightly larger amounts of most essential amino-acids. The meat material contained significantly higher amounts of essential amino-acids than the processed bones and had an overall composition intermediate between whole muscle protein and collagen. The hydroxyproline contents, supported by values for other amino-acids, indicated that the protein from processed bones contained about 83%, and the meat protein some 58%, of collagen, and that in commercial meat and meat-and-bone meals 50 to 65% of the total protein was collagen. Since collagen is deficient in several essential amino-acids, its presence in large amounts may be expected significantly to reduce the nutritional value of the total protein of feeding meal. It is suggested that the determination of hydroxyproline could form the basis of a simple method for the assessment of protein quality in meat and bone meals.

Proteolysis in the storage of beef.

R. H. Locker, *J. Sci. Food Agric.* **11**, 520 (1960). The method of N-terminal analysis has been applied to the protein fractions of beef to detect proteolysis on storage at low or high temperature. Parallel studies have been made on the histology, non-protein nitrogen and free amino-acids, and on the extractability and electrophoresis of the structural proteins. While definite small increases in free amino-acids occur, increases in N-terminal groups were negligible. Other results give no evidence of proteolysis. It is concluded that proteolysis is not a significant factor in the tenderising of beef by ageing.

Studies on protein concentrates for animal feeding.

J. Bunyan & S. A. Price, *J. Sci. Food Agric.* **11**, 25 (1960). The protein quality of a wide range of common protein foods has been investigated by means of chemical, biological and microbiological tests. B vitamin contents have also been determined in some materials. Results for a large range of meat meals, whale meat meals, fish meals and miscellaneous samples are presented and discussed in separate sections, and attention drawn to the existence of certain correlations.

GENERAL

A new development in vegetable oil refining equipment.

Herbert R. Kaiser and Collin M. Doyle (Podbielniak Inc., Chicago, Illinois) *J. Am. Oil Chemists' Soc.* **37**, 4 (1960). New developments, using the rotating contactor, in the vegetable oil processing industry have been described and illustrated. Results from various refining operations on a number of oils have been presented. Economies from reduction of capital expenditures and operating costs are expected to accrue to the user. He can also choose the process to give those products best suited to the market. The improved rotating contactor offers to the vegetable oil processor a most versatile plant.

Epoxy resins from fats. III. Preparation and properties of resins from blends of a commercial diglycidyl ether and epoxidized glycerides cured with phthalic anhydride.

Leonard L. Gelb, Waldo C. Ault, William E. Palm, Lee P. Witnauer and William S. Port (Eastern Regional Research Laboratory, Philadelphia, Pennsylvania) *J. Am. Oil Chemists' Soc.* **37**, 80 (1960). Three series of resins were made by curing mixtures of a diglycidyl ether and epoxidized, natural glycerides (lard oil

and soybean oil) with phthalic anhydride. One property of the uncured system that was affected was the gelation time, a measure of the working pot life. All members of the epoxidized lard oil series took three hours to gel. The time of gelation of the epoxidized soybean oil series varied inversely with the concentration of diluent, and all members of the epoxidized soybean oil series containing tertiary amine gelled in four minutes.

Some physical properties of the resins were measured. The heat distortion temperature was a linear function of the percentage of epoxidized oil in each series. Up to 20% level both epoxidized glycerides had the same HDTs, but at higher concentrations the HDTs for the epoxidized lard oil resins decreased more rapidly. The blends containing a tertiary amine had HDTs constantly higher by 25 degrees than corresponding blends without amine.

The tensile strengths of the resins from each series decreased non-linearly at the same rate up to a concentration of 20% of epoxidized glycerides. At higher concentrations the tensile strengths of the epoxidized lard oil series dropped the most and the mine-containing systems the least. Epoxidized lard and soybean oils appear promising as modifiers for diglycidyl ether resins up to a 20% level.

Continuous refining of crude coconut oil in a pressure system.

Frank E. Sullivan (The De Laval Separator Company, Poughkeepsie, New York) *J. Am. Oil Chemists' Soc.* **37**, 195 (1960). A continuous process for refining crude coconut oil has been described. This Hermetic system provides a means for continually controlling the variables of time, temperature, and reagent on a scientific, predictable basis. By utilizing the phase diagram as a guide for the correct conditions and employing a continuous process designed to maintain these conditions, it is always possible to obtain high yield refining results on crude coconut oil.

Studies in the development of antibacterial surfactants. I. Institutional use of antibacterial fabric softeners.

W. M. Linfield, J. C. Sherrill, R. E. Casely, D. R. Noel and G. A. Davis (Soap Research Laboratories, Grocery Products Division, Armour and Company, Chicago, Illinois) *J. Am. Oil Chemists' Assoc.* **37**, 248 (1960). It has been determined that the incorporation of a highly active antibacterial agent, phenylmercuric propionate, into an aqueous solution of a fabric softener of the quaternary ammonium type results in a most effective antibacterial laundry rinse additive. The presence of the quaternary ammo-

nium compound appears to enhance the antibacterial activity of the mercurial. When applied at a level of 63 parts of available mercurial to one million parts of fabric, the treated cloth is rendered bacteriostatic to several strains of *S. aureus* and to ammonia-producing organisms of the *Proteus* group, also mildewstatic to *Chaetomium globosum*. The formulated antibacterial softener as well as the treated linens appear to be entirely safe to humans.

In longer-term application tests in a hospital laundry the total bacterial load carried by the soiled treated linens is practically zero. There is no excessive build-up of antibacterial agent on fabric upon repeated applications, and it is readily washed out of the fabric by conventional laundering.

Studies in the development of antibacterial surfactants. II. Performance of germicidal and deodorant soaps.

W. M. Linfield, R. E. Casely, and D. R. Noel (Soap Research Laboratories, Grocery Products Division, Armour and Company, Chicago, Illinois) *J. Am. Oil Chemists' Soc.* **37**, 251 (1960). It has been shown that mixtures of hexachloropene and trichlorocarbanilide or bithionol and trichlorocarbanilide in soap show a marked synergism with respect to antibacterial properties. In both cases the approximate ratio of 50/50 of the two components represents an optimum.

Nonionic detergents enhance the antibacterial activity of trichlorocarbanilide *in vitro* when present at relatively low levels. At higher levels of nonionic the antibacterial agent is neutralized and loses its effectiveness.

The antibacterial activity of the pair hexachlorophenetrichlorocarbanilide extends over a wide spectrum of microorganisms, and synergism is shown with each test organism.

High antibacterial activity of the synergistic pairs in soap is shown both in *in vivo* handwashing studies and in subjective deodorant tests. On the other hand, it is shown by way of several examples that *in vivo* observations do not necessarily correlate with *in vitro* bacteriological screening tests.

Amides of alpha-sulfonated palmitic and stearic acids.

J. K. Weil, A. J. Stirton, and R. G. Bistline (Eastern Regional Research Laboratory, Philadelphia, Pennsylvania) *J. Am. Oil Chemists' Soc.* **37**, 295 (1960). Carboxylic acid amides of alpha-sulfo-palmitic and alpha-sulphostearic acids were prepared from am-

monia, ethylamine, ethanolamine, isopropylalcoholamine, diethanolamine, and N-methyltaurine, and were isolated as the sodium, ammonium, or ethanalammonium salt.

A satisfactory method was found to be the reaction of the sulfocarboxylic acid with an excess of thionyl chloride, and further reaction of the acid chloride with an amine in a chlorinated solvent. More work is needed on the application of direct amidation methods to the preparation of these compounds.

The solubility of the alpha-sulfonated amides increased with substitution of alkyl, hydroxyalkyl, and sulfoalkyl groups at the nitrogen atom. Ethanalammonium N-hydroxyethyl-alpha-sulfo-palmitamide, ethanalammonium N-hydroxyethyl-alpha-sulphostearamide, sodium N-(2-hydroxypropyl)-alpha-sulphostearamide, sodium di-(N-hydroxyethyl)-alpha-sulphostearamide, and disodium N-methyl, N-(2-sulfoethyl)-alpha-sulphostearamide have aqueous solubility in excess of 10% at room temperature.

Most of the sodium salts of the alpha-sulfonated amides have good or excellent stability to calcium and other divalent ions and are excellent lime soap dispersing agents.

Chromatographic isolation of the original constituents of natural waxes. The composition of ouricuri wax.

Leslie J. N. Cole and J. B. Brown (The Ohio State University, Columbus, Ohio) *J. Am. Oil Chemists' Soc.* **37**, 359 (1960). A chromatographic method was developed which separated a known mixture of alleged wax constituents into four groups, *viz.*, dotriacontane, octadecyl stearate and stearone, octadecanol, and stearic acid on especially prepared alumina. This adsorbent, when prepared fresh, did not give a satisfactory separation of spermaceti wax. On re-use after regeneration by exhaustive washing with methanol and water, spermaceti wax was resolved into esters (95.4%), alcohols (2.6%), and acids (1.2%). A resolution of ouricuri wax into four major classes (nine fractions) was obtained on alumina (M. Woelm, aniontrophic, pH4) of lesser adsorptive activity than the two previous preparations. Two of the latter fractions were further resolved on silica gel. There is *a priori* evidence that the constituents of natural plant waxes do not conform rigidly to the pattern of mixtures of simple normal esters. An estimated composition of ouricuri wax (in per cent) is hydrocarbons 1.3, simple esters 23.5, hydroxy-mono-esters 22.4, hydroxy-di-esters 17.2, hydroxy-acidic-poly-esters 5.4, free acids 8.7, free alcohols 3.0, resins 14.8, moisture 1.4, and ash 0.4.

Changes in the adenosinetriphosphatase activity and sulphydryl groups of cod flesh during frozen storage.

J. J. Connell, *J. Sci. Food Agric.* **11**, 245 (1960). The adenosinetriphosphatase (ATP-ase) activity, 'easily-reactable' and total sulphydryl groups of cod flesh have been determined during frozen storage for upto 170 weeks at -14° , -22° and -29° . At -29° no change in enzyme activity could be detected, but at -22° and -14° definite loss of activity occurred. The rate of loss of activity at these two latter temperatures was very much less than the rate of development either of insolubility of the enzyme, or of toughness of the flesh. No change in either 'easily-reactable' or total sulphydryl groups was detected at any storage temperature.

Pilot-Plant studies on the preparation of crude papain from raw papaya.

G. V. Krishnamurthy, B. S. Bhatia, Girdhari Lal and V. Subrahmanyam, *J. Sci. Food Agric.* **11**, 433 (1960). The results are presented of an investigation of the yield and total solids content of the latex obtained in successive tappings of papaya fruit and of the yield and activity of the crude papain obtained from the latex samples by sun- and vacuum-drying. The effect of the addition of metabisulphite, with and without thymol, on the activity of the dried products is described.

Gibberellic acid. XI—The growth-promoting activities of some functional derivatives of gibberellic acid.

J. S. Moffatt & Margaret Radley, *J. Sci. Food Agric.* **11**, 386 (1960). A number of derivatives of gibberellic acid have been prepared and their growth-promoting activities compared. Eleven salts and four acyl derivatives showed activities similar to that of gibberellic acid when applied to the roots or to the leaves of dwarf pea seedlings. Five esters and nine acyl derivatives of esters showed no activity when applied to the leaves; most of them were moderately active when applied, in aqueous culture solutions, to the roots possibly because they underwent slow hydrolysis.

NOTES & NEWS

Second Seminar on Leather, Footwear and Leather Goods Industries

The second Seminar on Leather, Footwear and Leather Goods Industries was held at Calcutta from April 6 to 8, 1961, under the auspices of the Small Scale Industries Organisation. Representatives of the Ministry of Community Development, Khadi and Village Industries Commission, Directorate of Industries, State Bank of India, Ministry of Food and Agriculture, the Development Wing, and the National Small Industries Corporation participated in the Seminar.

The Seminar was inaugurated on April 6, 1961, by Shri Bhupathi Majumdar, Minister for Commerce and Industries, West Bengal. Shri K. S. Roy Chowdhury, Director, Small Industries Service Institute, Calcutta, delivered the welcome address. Dr. H. A. Shah, Director (Chemicals), Office of the Development Commissioner, Small Scale Industries, New Delhi, also addressed the gathering.

The deliberations of the Seminar were conducted in the course of five sessions from the afternoon of April 6 to 8, 1961. After reviewing the action taken on the recommendations of the first Seminar held in 1958, the Seminar discussed the following:

Development programmes for the tanning, leather goods and footwear industries in the small scale sector in the Third Five year Plan, assisting these industries through provision of factory accommodation, credit facilities and industrial design, opening depots for distribution of essential chemicals and spare parts, steps to be taken for increasing production of goat skins in blue for export, problems connected with the export of finished leather in place of E.I. leathers, production of good quality shoe upper and light leathers from fallen stock, modernisation of indigenous tanning methods as practiced in the small scale sector, development of by-product hair processing industry, modernisation of footwear industries, problems in marketing leather goods and footwear, supply of standard lasts, pattern and common facilities to the small scale footwear industry, training in repairing leather goods, manu-

facture of quality sports goods particularly for export and development of equipment, and tools and instruments for the leather footwear and leather goods industries.

Several recommendations were made at the conclusion of the Seminar.

On April 6, 1961, Shri Majumdar also declared open, a chrome tanning centre in the Tangra area, for providing aid to tanners. The centre has been set up by the Small Scale Industries Organisation.

Castration of Scrub Bulls

Campaign in Orissa

All scrub bulls and male calves above the age of 12 months in different parts of Orissa will be castrated during a Statewide castration campaign from May 8 to 14.

The presence of these bulls, according to a Press Note issued by the State Government, impedes the progress of cattle improvement in the State. Stray bulls have affected "the breeding policy of the State". Castration operations will be undertaken by technical staff of the Animal Husbandry and Veterinary Services Department free of cost.

The Mail : May 1, 1961.

Leather Board for Andhra

The Andhra Government has decided to set up a Leather Development Board and a Bill giving effect to this decision is expected to be introduced during the next session of the Assembly.

This was disclosed today by Mr. Konda Laxman, Andhra Minister for Small-scale Industries. He said that the setting up of the board was one of the main recommendations of the committee on leather industry, appointed with the Director, Central Leather Research Institute, as Chairman. The State Government would in the meantime set up an ad hoc board which would function till the statutory board was constituted.

The Government has provided Rs. 1 crore in the Third Plan for development of leather industry, in addition to Rs. 1½ crores allotted to it by the Khadi and Village Industries Commission.

The Mail : May 4, 1961.

Shipments of Hides and Skins during April, 1961.

The shipments of hides and skins during April, 1961 were as follows (in bales): 2175 tanned cow hides, 145 calfskins, 34 buff hides, 317 buff calfskins, 591 goatskins, 391 sheepskins to the U.K.; 15 cow hides, 75 cow calfskins, 186 buff calfskins, 609 goatskins, 337 sheepskins to the Continent; 158 buff hides, 228 buff calfskins, 126 goatskins to the U.S.A.; 234 sheepskins to Japan; 27 sheepskins to Eastern Europe; 5 goatskins, 1 sheepskins to Australia; 18 goatskins, 4 sheepskins to New Zealand. Total 5,676 bales.

The Mail : May 7, 1961.

Improvement of Cattle Wealth in Madras State

Village Centres for Chingleput

As part of the schemes for improvement of the cattle wealth of the State, two more Key-Village Centres will be established in the Chingleput District, in addition to the four centres already functioning in the district.

The Poonamallee Centre, one of the four centres now functioning in the Chingleput District was started in December 1956 and since then, this centre has been implementing an intensive programme in about 48 villages in and around Poonamallee. The work at the Centre is aimed mainly at improving the breed of cattle through artificial insemination made available free to both at the Poonamallee centre and at six Sub-Centres in the various places catering to particular groups of villages.

The Key Village Centre is under the charge of a Veterinary Surgeon, who is assisted by a team of trained stock-men and other personnel. The centre is also equipped to provide facilities for treatment of cattle which suffer from common diseases.

The most important aspect of the work carried out by the centre is on the preventive side. Periodically, field surveys are carried out in the villages and mass vaccination of cattle is done. This has enabled almost complete control of diseases among cattle. Castration of useless cattle is yet another important feature of the programme that is followed intensively to improve the breed of cattle.

The Hindu : May 5, 1961.

Foot-wear training centre

The Central Foot-wear Training Centre, Guindy, Madras, which is now conducting a nine-month course for training personnel intended for the small scale foot-wear industry in the country has converted it into a 18-month course to make the training more broad-based and comprehensive.

Lt.-Col. E. P. Raju, Director of Small Industries Service Institute, Madras told a representative of THE HINDU that the Centre was the only institution in the country which was imparting training to candidates in foot-wear manufacture.

The proposed building at Guindy for housing the Small Industries Service Institute now under construction at a cost of Rs. 7½ lakhs, is expected to be completed by October, 1961.

The Centre is now imparting instruction to over 80 trainees drawn from various States in the country. Each trainee is paid a stipend of Rs. 60 per month.

Mr. N. R. Lodh, Deputy Director and Officer-in-charge of the Centre said that the training imparted at the institution had a practical bias.

The next course will commence some time in July, 1962.

The Centre is now training 28 Tibetan refugees in chappal-making at the instance of the Government of India.

The Hindu : May 11, 1961.

Forest-based Industries

Madras Govt's Plans

Presiding over the eighth meeting of the Madras State Forest Utilisation Advisory Board, Mr. M. Bhakthavatsalam, Minister for Agriculture and Forests, stated that the Government of Madras had decided to undertake a pre-investment survey of forest resources in all the forest areas of the State with a view to ascertaining their industrial possibilities. The State Forest Department, he said, had proposals for the development of forest wealth of the State, under the Third Plan involving an expenditure of Rs. 281 lakhs, which was double the outlay of the Second Plan.

The Minister said that during his visits to the wattle plantations in the Upper Palni Hills, he was impressed with the

possibilities of exploiting them for industrial purposes. It would be a good move if such industries based on forest products could be located near the source of the raw materials instead of locating them far away. The wattle wood, for instance, should easily support a chip board or similar industry. He asked the members to discuss this question and suggest practical ways.

The Hindu : May 19, 1961.

Jabalpur Gelatine Factory

Mr. Jagmohan Das, Deputy Revenue Minister of Madhya Pradesh, laid the foundation stone of the Leiner-Knit gelatine factory, ten miles outside Jabalpur.

The factory first of its kind in India, is being constructed by P. Leiner and Sons of Treforest, Glamorganshire (England), with the help and collaboration of Kapurthala and Northern India Tanneries Company.

Mr. Leslie Leiner, one of the directors of the proposed factory, thanked both the Government of India and the Madhya Pradesh Government for their help, which, he affirmed, would be put to the best possible use. Emphasizing the importance of gelatine in industry, Mr. Leiner pointed out that the factory's products would be essential for paper, rayon, and raw film manufacture.

The Statesman : April 10, 1961.

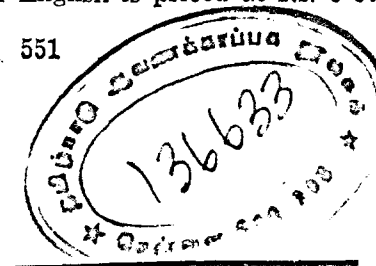
Indian Standards Institution Specifications

Cellulose nitrate for use in coated fabrics :

The ISI has just published IS: 1627-1960 specification for cellulose nitrate for use in coated fabrics.

Cellulose nitrate required for the production of coated fabrics is usually a high or medium nitrated, relatively more soluble product, as distinct from the material used in the plastics, lacquers or film industries. Although coated fabrics based on cellulose nitrate are being replaced by the vinyl coated type, there is still considerable demand for the former. IS: 1421-1959 specification for cellulose nitrate coated fabrics, together with this present standard would be able to meet the requirements of that section of the coated fabrics industry which uses cellulose nitrate for preparation of the dope.

The standard published in English is priced at Rs. 5.50.



Untrimmed (raw stock) paper sizes and substances of paper and pulp board:

The ISI has issued the following two draft Indian standard specifications for the paper industry:

(1) Untrimmed (Raw stock) paper sizes and (2) substances of paper and pulp board. Paper and pulp board are being manufactured in the country in a variety of sizes and substances which calls for an attempt to reduce and rationalize the uneconomical varieties. Both the draft standards have been prepared with this objective and they also reflect the present international trend of thought as prevailing in the technical committee for standardisation of paper and paper products of the International Organization for Standardisation.

The draft standard dealing with untrimmed paper sizes prescribes the sizes of raw stock paper, that is the sizes in which paper should be manufactured and stocked by mills and dealers. The second draft standard which deals with substances lays down a rational series of substances in which raw stock paper should normally be available. It is hoped that producers and consumers of paper in India will now be able to adopt the metric sizes of paper which have been internationally recognised and have been found not only rational but also advantageous and economical in actual use.

Copies of the draft standards are available free on request.

Methods of sampling of industrial water for physical and chemical tests:

The ISI is issuing, for wide circulation draft Indian standard methods of sampling for industrial water for physical and chemical tests to all interests concerned with a view to eliciting comments.

While normal variations in processes and in equipment from plant to plant preclude the possibility of specifying methods of sampling that are applicable in all cases, definite principles have been established as a basis for the formulation of procedures for sampling which are applicable in general, in most cases.

Copies of the draft standard will be available free on request.

Copies of both priced and non-priced standards will be available from the office of the Indian Standards Institution, Manak Bhavan, 9, Mathura Road, New Delhi-1 and from its branch offices at Bombay, Calcutta and Madras.

Silvichemical Aims for new outlets

Low-cost, cold-setting adhesives made by partially replacing resorcinol with an inexpensive bark extract (C & EN, June 13, page 47) could mean another commercially successful silvichemical for Rayonier. The silvichemical is HT-120, a polyphenolic intermediate extracted from the bark of Western hemlock. Rayflo, Rayonier's other silvichemical, is also a western hemlock bark extract, is used as a dispersant for oil well drilling muds. It is produced at Vancouver, B.C.

HT-120 is a polyflavonoid made by digesting the bark with aqueous ammonia, then heating the extract with sodium hydroxide to convert it to the sodium salt. Spray drying makes it a stable, dry powder. Rayonier is producing the silvichemical in pilot plant quantities at Hoquiam, Wash.

Chemical & Engineering News: June 27, 1960.

GC takes on Copolymers

National Bureau of Standards has applied gas chromatography to the tough job of characterising polymers and copolymers. The bureau has worked out a method for acrylics, says it can detect as little as 0.2% copolymer with a precision of within 0.5%.

NBS uses a commercial chromatograph with a stainless steel column containing dinonyl phthalate as the stationary liquid phase coated on ground fire brick as the inert, solid support. Helium is the carrier gas.

Chemical & Engineering News: July 11, 1960.

Why nonionic syndets foam

A theory of why nonionic detergents make foams and what determines their stability was advanced by Dr. Martin J. Schick of Lever Brothers at the 34th National Colloid Symposium at Lehigh University. Stability of nonionic foams, he says, depends on two types of forces working together—hydrogen bonding and van der Waals forces. In ionic detergents, however, van der Waals forces alone are considered to be the determining factor.

In general, the nonionic syndets form unstable foams, Dr. Schick points out. Foam stability passes through a maximum at a point that he and coworker Emil A. Beyer call the critical hydrophilic-hydrophobic balance (CHHB).

Two Factors:—Foam stability is linked to two principal factors—foam drainage and film rupture. Typical nonionic detergents form fast draining foams. But the foam is most stable at the CHHB, where it drains the least. Also, the film shows the greatest cohesive forces at the CHHB, resists rupture best at this point.

Dr. Schick and Mr. Beyer use polyoxyethylated long chain alcohols in their research, estimate the size of the cohesive forces by considering the molecular configuration of the detergents at the air-water interface. At the CHHB, they postulate, the hydrophilic portion of the molecule changes its texture from a matted hydrated coil to a free-drawing unhydrated structure. At this point, cohesive forces—the sum of the van der Waals forces between the hydrophobic “heads” of the molecule and the hydrogen bonds of the coiled hydrophilic “tails”—reach a maximum. All the experiments were run at 55°C., considered a typical temperature in home laundering.

In the matted coil, hydrogen bonds become significant, Dr. Schick explains. The dimensions of the tight coil are smaller than the effective range of hydrogen bonds (about 5 Å.). The total strength of these bonds increases as hydration increases, reaches a peak at the CHHB, he says. As the coil grows still larger, the effective range of the hydrogen bonds is exceeded. As a result, their contribution to foam stability becomes less important.

Chemical & Engineering News: July 11, 1960.

Etched Films extend X-Ray Microscopy

A new technique in X-ray microscopy magnifies up to about 40,000 diameters, may open up exciting possibilities in biology, metallurgy, and other fields. Dr. Saara Asunmaa, working under Dr. Howard H. Pattee, Jr., in Stanford University's biophysics laboratory, achieves this magnification by combining the methods of X-ray microscopy with those of electron microscopy (C & EN, July 11, page 35).

Until now, the limit of the X-ray microscope has been 2000 diameters. The electron microscope has a limit of 100,000 diameters or more. But many specimens are opaque to electrons; only the outline or surface can be examined this way.

Dr. Asunmaa makes a contact X-ray micrograph on a sensitive film in which the absorbed radiation changes the electron

density. This film is then used as a specimen in the electron microscope. The film that does the trick is made of cellulose nitrate activated with silver chloride. Dr. Asunmaa mixes lithium chloride and silver nitrate in an acidic medium with a 2% solution of cellulose nitrate in ethanol and ether. From this she casts the thin films—about 1000 Å. thick—on glass slides, then ages them in a desiccator.

Chemical & Engineering News: July 25, 1960.

Second Photosynthesis Mechanism found

A second route for photosynthetic fixation of carbon dioxide apparently exists in plants, according to scientists at Charles F. Kettering Foundation, Yellow Springs, Ohio. Results obtained there indicate that carbon dioxide is directly converted to glycolic acid with the help of manganese.

This mechanism, says Kettering's research director, Dr. Howard A. Tanner, exists together with the photosynthetic reaction discovered by University of California's Dr. Melvin Calvin. In the Calvin cycle, carbon dioxide reacts with ribulose diphosphate to form phosphoglyceric acid.

Discovery of the apparent mechanism in autotrophic cultures of various algae and aquatic plants (cultures that grow on carbon dioxide and light) climaxes Kettering's study of the role of manganese and chlorine in photosynthesis. Previous work done there indicates that autotrophic growth requires traces of both.

Main role for manganese seems to be in aiding oxygen production.

Chemical & Engineering News: August 15, 1960.

Amino Acids shape polypeptide structure

The nature of the amino acids composing a synthetic polypeptide chain determines molecular conformation of the material, according to Dr. Elkan R. Blout and associates at Children's Cancer Research Foundation and Harvard Medical School. They report that there are at least two classes of natural amino acids: those forming α -helical polypeptide structures and those giving either β (extended) or random (nonperiodic) conformations.

Both the extended (pleated-sheet) and random polymers derive from two different types of amino acids. The first type is disubstituted by other than hydrogen on the β -carbon atom—poly-L-valine, for example. The second has a hetero-atom (such as sulfur or oxygen) attached directly to the β -carbon—such as in S-methyl-L-cysteine and L-serine.

Steric Hindrance:—The valine type of amino acid doesn't form α -helical structures in a polypeptide because the side chains create marked steric hindrance in a helix, Dr. Blout points out. This seems to prohibit intra-molecular hydrogen-bonding of the peptide groups by keeping the bond sites too far apart for the forces to be effective. Consequently, the extended chains will bond intermolecularly to form a pleated lamellar structure.

Dr. Blout and his group aren't sure the β -hetero-atom-substituted amino acids do not form α -helices. However, H-bonding between the peptide group and the heteroatom may occur, and they suspect that this could then prevent helix formation.

α -Helix Formation:—Regular helical structures do form, though, from pure leucine. In this case, Dr. Blout feels that the additional methylene group between the side chain and the β -carbon removes the bulky isopropyl residue far enough from the core of the helix to avoid steric hindrance.

Similarly he suggests, the sulfur atom in poly-L-methionine (next higher homolog of the poly-S-methyl-L-cysteine) is pushed far enough out to minimize its effect. This permits the "preferred" intramolecular S-bonding of the helix to take place.

Chemical & Engineering News: August 15, 1960.

Solubilization pegged as a key to detergency

Solubilization now appears to be an important mechanism in detergent action with oily soil systems (C. & E. N., Aug. 22, page 37). With the help of a new, radioactive tracer analytical technique, chemists at Monsanto's research and engineering division (Dayton, Ohio) find that more oily (or fatty soil dissolves in a surfactant solution than was formerly thought. Also found: Solubilizing action seems to be the driving force behind this type of detergency.

Use tagged fats:—The tracer analysis consists of washing a fatty soil tagged with carbon-14 from glass, then measuring remain-

ing radioactivity. Either C^{14} -labelled tristearin or triolein is in the fatty soil used. With tristearin, C^{14} is on a carboxyl group; triolein's tag is on glycerol.

Although other substrates can be used besides glass (cloth, for example), the Monsanto team chose glass for convenience and because its chemical composition is known. The analysis is standardised for roughed (with Carborundum) microscope slides. Roughing the glass gives it 1.9 times the surface area of smooth specimens, also forms hemispheres which soil can adhere to.

After the roughed slides are coated with known amounts of tagged soil, they're washed and remaining radioactivity measured. The solubilization technique will pick up concentrations of tagged soil (as fat) as low as 0.00005%, thus making the method quantitative, claims Mr. Harris. Other methods are primarily qualitative, he notes. Usually, visual or photometric techniques are used to detect turbidity (cloud point).

Correlations which lend further weight to the stabilization theory:

The greater a surfactant's solubilizing action, the greater is its ability to remove fatty soil from substrate. In this respect, non-ionics are more effective than ionics.

Solubilization and soil removal both begin (with nonionics) when cmc is reached. Also found: Maximum solubilization occurs at the cloud point, as does maximum detergency.

Chemical & Engineering News: August 29, 1960

Anthogens boost plants

Hormone-like materials extracted from plants can be used to control blossoming time, also make plants bloom in poor light. And the hormones help a plant overcome factors like high temperatures and low soil nutrient levels, according to Dr. R. H. Roberts of the University of Wisconsin.

Plant physiologists have long suspected that plants contain some kind of specific blossom producing substance. Dr. Roberts told the annual meeting of the American Institute of Biological Sciences, held in Stillwater, Okla. Called anthogens, the agents were observed by Dr. Roberts about 12 years ago when he extracted a related material called antiauxin from lipide fractions of plants. So far, anthogens have defied structural analysis, are

known only to be noncyclic carbohydrates having about 40 carbon atoms.

At least three distinct anthogens exist, says Dr. Roberts. One is extracted from plants in an early stage of bud development. The second comes from plants having more fully developed buds, while the third one is obtained from plants already in flower. The last anthogen stimulates blossom development, says the Wisconsin horticulturist.

Chemical & Engineering News: August 29, 1960.

Ultracentrifuge picks out new proteins

The ultracentrifuge can be a useful tool for distinguishing newly synthesized proteins in a cell-free system, according to Dr. A. S. L. Hu of the University of Wisconsin. The technique—applied successfully by others to separate nucleic acids—uses density gradient sedimentation to fractionate a given protein containing heavy isotopes from the same, but unlabelled, species.

Dr. Hu and coworkers—Dr. R. M. Bock and Dr. H. O. Halvorson applied the method to β -galactosidase, a constituent of *Escherichia coli*. They grew the *E. coli* (strain ML 308) in three different media, containing $N^{14}H_4Cl$, $N^{15}H_4Cl$, and $N^{15}H_4Cl$ in 99.5% D_2O , to give enzymes A, B, and C. They extracted the enzyme from each culture, then carried out equilibrium sedimentation in $RbCl$ gradients on enzymes A, B, and C and on mixtures of A with B and A with C.

Complete separation:—This method, Dr. Hu says, gives measurable separation of enzyme A from B and complete separation of enzyme A from C. Thus, he concludes, the technique appears to be useful in distinguishing new proteins from those present when the isotopic environment is changed.

The Wisconsin group has also grown *E. coli* in a medium containing amino acid labelled with carbon-13. Here again, they were able to separate the labelled from the unlabelled enzyme.

The Wisconsin chemists believe that this method can fractionate proteins normally found in tissues just on the basis of their natural density differences.

Chemical & Engineering News: September 19, 1960.

New rival to Carnauba wax appears for leather finishing

Waxes are used extensively in leather finishing.

As Bernard A. Roll, of Atlas Refinery, Inc., U.S.A., pointed out, they have a two-fold purpose: (1) The softer waxes such as beeswax, paraffin, etc., are used to produce a particular surface feel. (2) The harder waxes such as candelilla, ouricury, and especially carnauba, are used to provide a high gloss as well as surface feel.

Carnauba is by far the most important wax in leather finishing. It is considerably harder than any other naturally occurring wax, it has excellent polishing properties, and, most important, it can be emulsified readily.

Consequently, it can be incorporated with a variety of water-base film-forming materials. Since, however, carnauba wax is always expensive and frequently uncertain as far as supply is concerned, there have been any number of substitutes offered through the years.

Montan wax was probably the first wax to be considered seriously as a replacement for carnauba wax in the leather industry. It is prepared by extraction of peat or bituminous lignite with solvents. The refined Montan wax is composed of about two-thirds high molecular weight esters, about one-fourth wax acids in the C_{24} to C_{32} range along with minor amount of free alcohols, ketones, and resins.

These acids, esters, alcohols, ketones, etc., can be made to undergo a variety of reactions, according to Mr. Roll. The Germans offered a number of chemically-modified Montan derivatives under the label of "Gersthofen Wax" prior to World War II.

Some of these came remarkably close to carnauba. Their acceptance in Europe was far more enthusiastic than in the U.S.A. Perhaps, the difference in cost between carnauba and most of the Gersthofen waxes was not sufficiently great to warrant greater acceptance here.

One of the most recent and most promising substitutes for carnauba is a wax obtained from the Fischer-Tropsch process for the production of hydrocarbons from carbon monoxide and hydrogen, Mr. Roll states.

He believes that the oxidized Fischer-Tropsch waxes have about every characteristic that has been sought in a carnauba sub-

stitute. Their melting point is higher than that of carnauba, hardness about equal, light in colour, stable, and their films yield the same order of transparency, brightness and gloss.

Leather Trades Review: October 19, 1960.

Ti-tan tannage by A. C. Lawrence provides rugged scuff-resistance

A revolutionary new tannage gives leather a rugged scuff-resistance and enhances its appearance, says its manufacturer, A. C. Lawrence Leather Co. of Peabody, Mass. this week.

The new tannage is named Ti-Tan and is the result of five years of extensive research and testing, the company reports. It promises a stimulating new-approach in the men's, boys' and children's markets where shoe manufacturers are already making plans for its presentation.

Lawrence officials report the new tanning process produces a tight, supple leather with a smooth, solid surface that has a desirable break. The leather details all the characteristics of natural leather since it uses regular leather finishes not a synthetic polyurethane. It will also hold a polish longer than regular tannage.

Scuff-resistant Ti-Tan is already being hailed as a boon to parents, the company adds. It will prolong the life of children's shoes, needs less care and has "breathing" qualities so necessary to foot health.

The new tannage is now available with manufacturing facilities operating to produce it in volume.

Leather and Shoes: October 15, 1960.

Washable leather

Lavalamb is a completely washable leather that can take washing machine, soap and detergents. It will retain its feel, strength, finishing and flexibility without kneading, stretching and milling. This is a white tannage on genuine lambskin. It may be table coloured in any hue through a special process says the manufacturer. It is used for infant shoes, garments, belts and handbags.

Source: Printz Leathers, Inc.

Leather and Shoes: October 29, 1960.

Acrylic emulsions

Acrylic emulsions especially developed for leather finishing are now available. Excellent water resistance, permanence with ageing, light stability and ease of workability are among the desirable properties of these polymer emulsions, says the manufacturer.

Acribinder 243: Specifically developed for finishing garment and upholstery leathers, producing an extremely soft and flexible film unaffected by temperatures as low as -60°F . In addition to the usual desirable properties Acribinder 243 offers excellent dry cleanability and low surface tack.

Acribinder 242: The complete lack of surface tack together with extremely high tensile strength and elongation are the outstanding features of this product. Affords excellent printability, plating properties, and solvent resistance.

Recommended for use as a co-emulsion due to its effectiveness in contributing the above properties to the blend.

Acribinder 257: A soft polymer recommended for base coats on side leather and on work shoe splits. Insures complete fibre tiedown without troublesome tack encountered in high temperature plating and hot stacking.

Acribinder 258: A medium hard polymer for middle and upper coats on side leather. Ideal also for lining splits; possesses outstanding feel and plating characteristics.

Acribinder 300: An unique acrylic copolymer, remarkable in its compatibility with a wide range of solvents, multivalent salts, chemicals which adversely affect emulsion stability. A chemically reactive polymer which is characterized by an unusually high adhesion to various surfaces.

Source: Jersey State Chemical Co.

Leather and Shoes: October 29, 1960.

C.L.R.I. NEWS

Dr. Y. Nayudamma, Director, or his representative has been nominated to serve as a member of the Sub-Committee for finishing East India tanned hides and skins constituted by the State Industries Development Committee of the Government of Madras. Sri P. S. Venkatachalam has been co-opted to the Sub-Committee.

Dr. S. K. Barat, Assistant Director, has been nominated to serve as member of the Panel for Salt & Marine Products, CDC 25: P3 of the Indian Standards Institution, New Delhi.

Dr. Y. Nayudamma, Director, attended the meeting of the Sub-Committee for finishing East India tanned hides and skins (under the Madras State Industries Development Committee) at Madras on May 1, 1961.

Dr. S. K. Barat, Assistant Director, attended the 8th meeting of the Forest Utilisation Advisory Board (Madras State) at Ootacamund on May 17, 1961.

Sri P. S. Venkatachalam, Senior Scientific Officer, attended the 2nd meeting of the representatives of Research Institutes, convened by the Railway Board at New Delhi on May 22, 1961.

Mr. M. A. Ghani, Senior Scientific Officer, attended the 2nd meeting of the Adhesives Sectional Committee (CDC 30) of the Indian Standards Institution at Calcutta on May 9 and 10, 1961.

Sri V. Radhananda Kishore, Senior Scientific Assistant, who has been deputed for higher training in Oil Technology in Czechoslovakia, Hungary and the U.S.S.R. under the United Nations Technical Aid Administration Programme, left Madras on May 6, 1961.

The assignment of Dr. K. Wolf as an UNESCO Expert with the Central Leather Research Institute, has been extended for a further period of 6 months with effect from July 2, 1961.

Sri T. K. Santhanam assumed charge of his duties as Stores Officer in this Institute with effect from May 2, 1961.

Sri K. C. Shivappa reported for duty as Junior Scientific Assistant (Hindi) in this Institute on May 22, 1961.

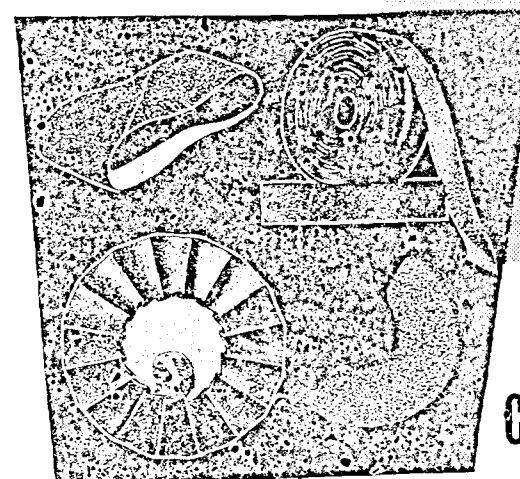
The following Junior Scientific Assistants have been promoted as Senior Scientific Assistants with effect from May 16, 1961.

Sri D. K. Das
Sri V. V. Subramanian
Sri S. C. Dhar
Sri G. N. Hore
Sri T. S. K. Mahadvan
Sri T. Vijayaramayya
Shri S. P. Ghosh

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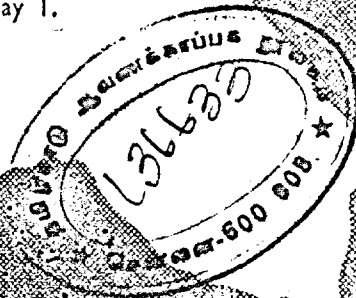
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