Number 4, December 1970

**Physical Sciences Section**



**Biological Sciences Section**

# Physical Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

## TEMPERATURE DERIVATIVES OF VISOCOSITY, DENSITY, AND REFRACTIVE INDEX FOR THE WATER–ETHANOL SYSTEM

### Part VII.—The Temperature Derivatives of Refractive Index for Water and Very Dilute Aqueous Ethanol from 0.2% to 1.8% Ethanol

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(Received July 16, 1969)

The present communication gives the results of new experiments on temperature derivatives of refractive index with sodium D light for very dilute aqueous ethanol solutions from 0 to 2% ethanol, at concentration intervals of nearly 0.2% ethanol. All the measurements, including a set of experiments on pure water, have been duplicated with the Pulfrich and V-Block refractometers. While the temperatures of the minima are found to be essentially the same with the two refractometers, the amplitudes of about half the minima are 2 to 4 times larger with the Pulfrich instrument, and it is conjectured that this may be due to interfacial boundary effects.

The mean results are plotted as a synoptic concentration–temperature chart, showing the minima from 0% to 1.8% ethanol. It is found that, while the pattern is broadly the same as previously reported, the measurements at intervals of 0.2% ethanol concentration show up several time details, particularly at the very low ethanol concentrations, and provide evidence of branching of at least one minimum into two separate ones, as well as of rapid shifts in the region between 0 and 0.3% ethanol concentration.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# SYNTHESES AND MASS SPECTRAL STUDIES OF SOME BENZDIAZOLES AND N-SKATYLTRIAZOLE

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(Received May 9, 1970)

Syntheses of *N*-skatylbenzimidazole (I), *N*-skatyl-2-methylbenzimidazole (II), *N*-skatyl-2-benzylbenzimidazole (III), *N*-skatyl-1,2,3-benzotriazole (IV) and β-(*N*-benzimidazolyl)-ethyl 3-phenanthryl ketone (V) have been achieved through alkylation reaction of gramine. Their mass spectra have been studied by analysing metastable peaks and mass numbers.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# POLAROGRAPHIC ANALYSIS OF COPPER BASE ALLOYS

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(Received November 6, 1969)

Two alloy systems Cu–Zn–Pb and Cu–Zn–Pb–Sn have been studied. Their polarography has been carried out in aqueous media using potassium chloride as the base electrolyte and normal calomel electrode (N.C.E.) as reference electrode. Since Sn (IV) forms a colloidal precipitate of $Sn(OH)_4$ in warm aqueous medium, it was separated from the system by ion exchange method and determined polarographically in hydrochloric acid medium.

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# THE QUENCHING OF TRIPLET STATES OF ANTHRACENE IN SOLUTION BY ELECTRON ACCEPTOR COMPOUNDS

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(Received October 4, 1969; revised April 3, 1970)

Decay rates of triplet anthracene in solution containing different electron acceptor compounds have been measured and the bimolecular quenching constants have been evaluated. The second order rate constants for various energy acceptors in solution and at room temperature conform to the CT mechanism of Linschitz type. In cases where the difference between the triplet level of the energy donor and the CT state is within the range of singlet–triplet split in the energy donor molecule, the value obtained for $k_Q$ corresponds to unit encounter frequency but when the difference is large, the efficiency falls.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# COPOLYMERIZATION OF ACRYLONITRILE AND ALLYL ACETATE AND DETERMINATION OF THEIR REACTIVITY RATIOS

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(Received September 3, 1969)

Copolymerization of acrylonitrile and allyl acetate with benzoyl peroxide as catalyst was carried out at $75\pm0.1^{\circ}$C. Monomer reactivity ratios were determined experimentaly using Mayo and Lewis, mole ratio and mole fraction methods. The values of $r_A$ and $r_B$ measured as above were then compared with the value obtained by the modified Hammett equation. The results show that acrylonitrile enters in copolymerization fifty times more rapidly than allyl acetate. Some of the physical properties of the copolymer formed are also studied.

**SHORT COMMUNICATION**
**PHYSICAL SCIENCES SECTION**

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# CHEMICAL CONSTITUENTS OF JUTE – CORCHORUS CAPSULARIS AND CORCHORUS OLITORIUS

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# Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

## STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

### Part XII.—Isolation and Structures of Haiderin, Rubinin, Shirin and Nasrin Metabolic Products of Aspergillus unguis Emile-Weil and Gaudin

AHMAD KAMAL, (Mrs.) YASMEEN HAIDER, A.A. QURESHI and (Mrs.) YEZDANA A. KHAN

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(Received June 8, 1970)

The isolation of four new depsidone metabolites from *Aspergillus unguis* Emile-Weil and Gaudin viz. *Haiderin* (IV), $C_{19}H_{19}O_6Cl$, m.p. 170°C; *Rubinin* (VII), $C_{20}H_{21}O_6Cl$, m.p. 162°C; *Shirin* (VIII), $C_{19}H_{17}O_5Cl_3$, m.p. 118°C; and *Nasrin* (XI), $C_{22}H_{21}O_5Cl_3$, m.p. 232°C have been described and their structures established.

Pakistan J. Sci. Ind. Res., Vol. 13, No 4, December 1970

# STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

## Part XIII.—The Biosynthesis of Yasimin, a Metabolic Product of Aspergillus unguis

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(Received June 18, 1970)

The biosynthesis of yasimin was established from head-to-tail condensation of one acetate and three malonate units for ring A.

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# STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

## Part XIV.—Biosynthesis of Amudol, a Metabolic Product of Penicillium martinsii Biourge

A. KAMAL, SHAHEEN A. HUSAIN, NAJMA MURTAZA, A.A. QURESHI and M.A. WAHID

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(Received June 15, 1970)

The biogenesis of amudol has been examined by feeding sodium (1-$C^{14}$)- and (2-$C^{14}$)-acetates. It has been shown that *amudol* is formed by head-to-tail aldol condensation of one acetate and three malonate units.

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# STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

## Part XV.—Synthesis of Amudol—a Mold Metabolite of *Penicillium martinsii* Biourge

A. Kamal, Nilofer Kazi, Shaheen A. Husain and Asaf A. Qureshi

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(Received September 15, 1970)

The synthesis of amudol (2,5-dihydroxy-4-chlorobenzyl alcohol), a metabolite of *Penicillium martinsii* Biourge, has been carried out starting from 2,5-dihydroxytoluene. A novel way has been employed to isolate the synthetic amudol as 2,5-dihydroxy-4-chloro-3,6-ditritiated benzyl alcohol.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

## Part XVI.—Interconversion of Yasimin and Nornidulin, Metabolic Products of Aspergillus unguis Emile-Weil and Gaudin

A. Kamal, Yasmeen Haider and Asaf A. Qureshi

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(Received September 15, 1970)

The structural relationship of yasimin and norniduiin has been established through chlorination of yasimin into nornidulin and dechlorination of norniduiin to obtain yasimin.

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# STUDIES ON THE SEED OIL OF ABRUS PRECATORIUS LINN

## Part I.—Composition of Total Fatty Acids

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(Received January 31, 1970)

Oils of seven varieties of locally available *Abrus precatorius* seeds were examined and the fatty acid composition was determined qualitatively and quantitatively by GLC. As many as seventeen fatty acids have been identified in the oils of these seeds. IR spectra show no unusual features (conjugation, *trans* or α, β-unsaturation). Although the pattern of fatty acids was found to be quite similar in all the seven varieties, the amounts of some constituent fatty acids differed slightly, especially in three principal varieties, namely white, black and scarlet.

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# STUDIES ON THE SEED OIL OF ABRUS PRECATORIUS LINN

## Part II.—Composition of the Lipid Classes

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(Received January 31, 1970)

The seed oils of white, scarlet and the black varieties of *Abrus precatorius* Linn were studied for their lipid composition with the help of TLC and GLC. Each oil was first separated by TLC into the respective lipid classes which were transmethylated and analysed by GLC for their fatty acid composition. The weight percentages of TG in the white, scarlet and the black varieties were 39.2, 25.3 and 40.6% respectively. The lower percentage of TG in the scarlet variety is probably due to incomplete enzymic esterification of the DG, which is higher in this variety (13.5%). The black variety contained the highest amount of FFA (35.5%), showing the possibility of higher activity of lipolytic enzymes. In the individual lipid classes, palmitic and behenic acids were the major saturated fatty acids. Amongst the unsaturated acids, oleic and eicosenoic acids were most predominent, while linoleic was present in appreciable amounts. Linolenic acid was present in higher proportions in the DG, MG and SE fractions of scarlet and MG, SE and PL fractions of the black variety. Presence of odd numbered C15:0 and branched chain C18:0 acids in the oils could have originated from microorganisms, a number of which have already been reported in the seeds of *Abrus precatorius* Linn.

Pakistan J. Sci. Ind. Res., Vol. 13 No. 4, December 1970

# STUDIES ON THE SEED OILS OF WITHANIA COAGULANS AND THEVETIA NERIFOLIA

## Part I.—Fatty Acid Composition

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(Received September 1, 1969; revised January 7, 1970)

The seed oils of *Withania coagulans* Dunal and *Thevetia neri folia* Juss on GLC analysis, have been shown to contain 16:0, 11.64 and 31.25; 18:0, 2.66 and 4.99; 20:0, 3.49 and 4.18; 18:1, 12.56 and 28.76 and 18:2, 69.65 and 29.25% respectively. Infrared spectra of the two oils indicated the absence of any unusual characteristics.

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# INCORPORATION OF IAA TO PROTEINS AND RNA IN VITRO*

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(Received July 4, 1969; revised March 30 1970)

The incorporation of IAA-1-$^{14}$C and IAA-2-$^{14}$C into buffer-soluble protein and RNA fractions of *Taraxacum* roots was studied *in vitro*. It was observed that a small proportion of the total auxin supplied was incorporated into protein and RNA. The incorporation of IAA-1-$^{14}$C increased linearly from 2–4 hr.

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# NEMATICIDAL PROPERTIES OF DIFFERENT AROMATIC FRACTIONS OF PETROLEUM

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(Received August 25, 1969; revised February 20, 1970)

Six aromatic fractions of petroleum (one of them chlorinated) were tested for their nematicidal properties against *Helicotylenchus* sp. The toxicity of these fractions was compared with that of Nemagon. The results indicate that Fraction 400N has got more nematicidal properties than the remaining fractions as it showed 100% mortality of *Helicotylenchus* sp. at a concentration of 30 ppm after 24 hr of treatment.

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# TOXICITY OF SOME INSECTICIDES TO THE RED COTTON BUG, DYSDERCUS KOENIGI (FAB)

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(Received October 24, 1969)

**The $LD_{50}$ values and relative toxicity of five organophosphorus insecticides, Azodrin,** Bidrin, Birlane, and Dimecron were determined by topical application to third instar nymph and adult of red cotton bug, *Dysdercus koenigi* (Fab.). **Azodrin and bidrin were found to be most toxic to the nymphs and adults, respectively. The nymphs were** comparatively more susceptible to the insecticides tested.

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# A NEW SPECIES OF LEPTUS FROM PAKISTAN (ACARINA: ERYTH RAEIDAE)

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(Received September 2, 1969)

A new species of mite belonging to genus *Leptus latrielle*, 1795 (=Achorolophus Berlese, 1891) has been described from Karachi out of a collection of 60 female specimens. Morphological description has been given and the species has been compared with the closely related species, *Leptus vilosus* Berlese, 1910.

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# ANDRABIA, NEW GENUS AND A. KASHMIRENSIS, NEW SPECIES (TYPHLOCYBINAE: CICADELLIDAE) ON THE PLANT TEMBER (ZANTHOXYLUM ALATUM) IN NORTHERN AREAS OF WEST PAKISTAN

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(Received October 16, 1969; revised February 19, 1970)

The genus *Andrabia*, new genus includes a single species. *A. kashmirensis*, new species a pest of wild plant tember, *Zanthoxylum alatum* in northern hilly areas of West Pakistan, particularly in the valleys of Azad Kashmir and Abbotabad. The genus is remotely related to a few erythroneurine genera described by Ghauri[1] and Mahmood[2] from Philippines Islands, but can be easily distinguished on the basis of characters of pygofer and male plate.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# BACTERIAL ORIGIN OF SOME INSECT PIGMENTS AND THE ORIGIN OF SPECIES THROUGH SYMBIOSIS

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(Received June 19, 1970)

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# THE LENGTH-WEIGHT RELATIONSHIP AND CONDITION OF TRICHIURUS SAVALA GUV. AND VAL.

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(Received October 20, 1969; revised March 10, 1970)

The method of analysing the length weight relationship of fish is reviewed. The total length–weight relationship of *Trichiurus savala* Guv. and Val. is expressed by $\log W = .00331 + .0935099 \log L$ for male and $\log W = -1.95865 + 2.19460 \log L$ for female subgroups. The regression of body weight on total length are calculated to be $Y = -15.68 + 1.3\ X$ and $+ = 33.8 = + .191\ Y$. The values of coefficient correlation, $r$ is found to be 0.498.

The mean values of condition, $K$ and relative condition factor, $Kn$ in the length–weight relationship of *Ts.avala* are 0.052 and 0.1203 for male and 0.055 and 0.66 for female subgroups.

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# STUDY ON LARVAE OF THE FAMILY XANTHIDAE (PILUMNUS) HATCHED IN THE LABORATORY (DECAPODA: BRACHYURA)

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(Received April 1, 1970; revised April 12, 1970)

Prezoea, first, second and third zoeae of *Pilumnus vespertilio* (Fabricius) and first zoea of *Pilumnus longicornis* (Hilgendorf) have been obtained by rearing from ovigerous female crabs in the laboratory. They are figured and described. A list of discrepancies noted in the previous studies[1,4] on these species has been included.

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# EFFECT OF THE COOLING PATTERN AND FREEZING DURING RIGOR ON THE QUALITY OF MUTTON

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(Received February 2, 1970)

**SHORT COMMUNICATION**
**BIOLOGICAL SCIENCES SECTION**

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# A STOMACHICOLID METACERCARIA*

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(Received November 25, 1970)

# Technology Section

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## EFFECT OF CHELATING AGENTS ON THE BIOSYNTHESIS OF RIBOFLAVIN BY CANDIDA GUILLIERMONDII

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(Received January 29, 1970)

The effect of chelating agents on riboflavin production, cell dry weight and glucose consumption by *C. guilliermondii* in shake-flask cultures was studied. The complexing agents tested were: ethylenediamine-tetracetic acid (EDTA), diaminocylohexane-*N,N*-tetra acetic acid (CDTA), diethylene-triaminepenta acetic acid (DTPA), and nitrilotriacetic acid (NTA). **The amount of chelating agents added to the medium was 2.02 to 18.36 mM.**

Of all the chelating agents, EDTA gave highest yield of riboflavin and their stimulatory effect was in the de**creasing order of EDTA, CDTA and DTPA.** NTA at all levels, however, did not stimulate riboflavin production. The stability constants of the metal chelates and their structural formulae were important factors in stimulating riboflavin formation.

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# NUTRITIONAL REQUIREMENTS OF STREPTOMYCES ROSEOCHROMOGENUS FOR THE PRODUCTION OF CYCLOSERINE

## Part II. Effect of Phosphorus, Magnesium and Trace Metals

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(Received November 4, 1969; revised January 19, 1970)

The nutritional requirements of *Streptomyces roseochromogenus* NRRL-B2036 for cycloserine synthesis in shake flasks were studied. Single variable and factorial experiments were conducted to determine the effects of nitrogen, potassium, magnesium, iron, manganese and zin con the production of cycloserine. The medium which gave best result was (g/l): starch 50 g, urea 4.8, $MgSO_4.7H_2O$ 5.0, $K_2HPO4$ 5.0, $FeSO_4.7H_2O$ 0.02, $ZnSO_4$ 0.02, and $MnSO_4$ 0.01. The yield of cycloserine was improved by increasing zinc or $K_2HPO_4$. Interactions were found between urea and $MgSO_4.7H_2O$, $K_2HPO_4$ and $MgSO_4.7H_2O$, urea and zinc, manganese and zinc and iron and manganese.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# STUDIES ON METHODS OF CITRIC ACID FERMENTATION FROM MOLASSES BY ASPERGILLUS NIGER

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(Received December 30, 1969; revised April 2, 1970)

A study of the effect of different concentrations of sugar and added inorganic nutrients and of different pH values of the fermentation medium on the citric acid production from cane molasses was made. The use of molasses in final concentration of 12.5–15.0% sugar was found best. The initial pH ranging from 3.5 to 6.0 in the molasses solution was found suitable for citric acid production. The concentration of added inorganic salts should not exceed 4.0 g $NaNO_3$, 1.0 g $KH_2PO_4$, 0.23 g $MgSO_4.7H_2O$, 0.02g $FeCl_3$, 0.0012 g $ZnSO_4$ and 0.0012 g $MnCl_2.H_2O$ in the fermentation of local cane molasses. At higher concentration of salts fungal growth increased and the citric acid production decreased. As a source of nitrogen, peptone was inferior to sodium nitrate and potassium nitrate whose effect appears to be the same in the citric acid production.

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# EFFECT OF METAL IONS ON THE PRODUCTION OF ACETIC ACID BY ACETOBACTER ACETI

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(Received February 4, 1970)

The metal ions requirement of *Acetobacter aceti* (Strain NRC-722) for acetic acid production were undertaken. All the metals were stimulatory at their optimum concentrations which varied from metal to metal. 3.7 % acetic and was produced in the presence of each of iron and calcium at a concentration of $10^{-3\cdot4}$M and $10^{-3\cdot6}$M, respectively, as against 0.6% in the absence of these metals. **The optimum level of magnesium, manganese and copper, for** maximum production of acetic acid was $10^{-3\cdot8}$M. The yield was further raised to 6.5% when all the metals were present at their optimum concentration.

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# PRODUCTION OF YEAST CELLS FROM HYDROCARBONS

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(Received December 30, 1969; revised March 14, 1970)

Seventeen strains of yeasts were propagated on media containing kerosene, n-hexadecane and Sui gas (a natural gas containing 95% methane), as the sole source of carbon. Kerosene inhibited growth of all the microorganisms, whereas n-hexadecane supported it. 5 strains utilised Sui gas, but the growth was less on n-hexadecane. Addition of 0.2% peptone to the medium stimulated the growth. A locally isolated yeast strain No. Y3/WRL gave a maximum (78.9%) conversion of n-hexadecane into cellular mass.

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# AN ASSAY OF SEVIN* FORMULATIONS USING MICRO STEAM DISTILLATION AND ITS APPLICATION TO STUDY OF INSECTICIDE DISTRIBUTION IN GRANULES

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(Received December 26, 1969)

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# SPECTROPHOTOMETRIC DETERMINATION OF PETKOLIN FROM PLANT SURFACES

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(Received March 31, 1969; revised January 14, 1970)

Spectrophotometric determination of residues of Petkolin was done on the cotton leaves, according to the method described by Avens *et al.*,[12] after certain modifications. Different concentrations and different volumes of the Petkolin emulsion were used for spraying and the amount of residue was calculated on the basis of colorimetric estimations by using Fat dye as an agent. It was found that the residue of Petkolin persisted for 5-7 days in all the replicates and patterns.

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# EVALUATION OF KEROCIL—A CHLORINATED MINERAL OIL AS PRIMARY PLASTICIZER

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(Received October 29, 1969; revised February 2, 1970)

Kerocil[1] a name given to a chlorinated mineral oil ($C_{12}$-$C_{17}$) has been found to be a good primary plasticizer for polyvinyl chloride (PVC). The process of its manufacture together with a detailed study of its plasticising properties on polyvinyl chloride has been carried out. The results of this study compare favourably with the other well-known primary plasticizer namely the dioctyl phthalate (DOP).

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# STUDIES ON THE PRODUCTION OF COMPOSITE COPPER LEAD POWDER AND BEARING SLEEVES

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(Received November 6, 1969; revised March 14, 1970)

The paper describes a new technique for the production of copper-coated lead powder and its subsequent use for making bearing sleeves.

The investigations outline the advantages of fluoborate over acetate process for the preparation of Cu-Pb powders and relate also how the different Cu–Pb composition and sintering temperature bring about variations in physical properties of the bearing sleeves.

Pakistan J. Sci. Ind. Res., Vol. 13, No. 4, December 1970

# FELTING POTENTIAL OF PAKISTANI WOOL

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(Received November 26, 1969)

The feltability of Pakistani wools has been investigated and an attempt has been made to examine correlations between this parameter and natural variations in the different wool characteristics. Product of number of crimps/inch and fibre diameter has been found to be an important factor, affecting the relative felting behaviour of various wools.

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# PLY EFFECT ON YARN SHRINKAGE DUE TO RELAXATION AND FELTING

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(Received December 26, 1969)

The relaxation shrinkage of worsted ply yarns increases with the single's ply number, twist factor and tex (yarn mass per unit length), but ply twist is unlikely to be a significant factor. Besides, the ply number has accounted for 99.9% variation of the relaxation. However, the yarn felting shrinkage usually decreases with the increase of ply number, especially, the even number. The general effect of ply number may correspond closely to that of twist factor rather than tex. Eventually, in harmony with observations on the worsted ply, a large difference of felting rates has been noted between 1- and 2- ply woollen yarns of 4 widely different wools.