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Pakistan J. Sci. Ind. Res., Vol. 13, No. 3, October 1970

THE EFFECT OF SOLVENT-SOLUTE INTERACTIONS ON ULTRAVIOLET SPECTRAL BANDS

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(Received April 26, 1969; revised October 7, 1969)

A study of the shift of the absorption maxima of the $n \rightarrow \pi^*$ absorption band for mesityl oxide (unsaturated ketone) and methyl ethyl ketone (saturated ketone) has been made in a range of solvents. Specific solvent–solute interactions have been found to occur throughout the range of solvents irrespective of their hydrogen bonding ability. A similar behaviour has been found for the $\pi \rightarrow \pi^*$ absorption band of mesityl oxide and the $n \rightarrow \sigma^*$ absorption band of methyl iodide.

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SPECTROPHOTOMETRIC STUDIES OF COPPER(II) AND CHROMIUM(III) IONS WITH TAURINE

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(Received September 17, 1969)

The association of Cu^{2+} and Cr^{3+} with taurine was investigated spectrophotometrically in aqueous solutions. For copper–taurine system, one complex having two moles of coordinated taurine with one mole of copper nitrate is indicated. While for chromium–taurine system one complex having three moles of coordinated taurine with one mole of chromium nitrate is indicated.. **Possible structure of the complexes is also suggested.**

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STUDIES ON HETEROCYCLICS

Part I.—The Ultraviolet Spectra of Some Quinoxaline Derivatives

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(Received August 6, 1969; revised October 10, 1969)

The UV spectra of a number of quinoxaline-3-ones, their *N*-methyl analogues and *N*-oxides are determined in ethanol and in ethanolic sulphuric acid, and their spectral characteristics are discussed.

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SPECTROPHOTOMETRIC DETERMINATION OF MICRO AMOUNTS OF BISMUTH AFTER EXTRACTION OF THE IODO COMPLEX BY A HIGH MOLECULAR WEIGHT AMINE

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(Received October 2, 1969)

An investigation of the complex formed between bismuth and potassium iodide in dilute sulphuric acid solution has been carried out and its extractability by a high molecular weight amine in organic solvent examined. The orange-coloured complex is quantitatively extractable from the aqueous phase into an organic phase of tribenzylamine in chloroform. On the basis of this extractability, a method has been developed for the spectrophotometric determination of bismuth in the presence of many other elements.

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SYNTHESIS OF SUBSTITUTED PYRIDINES

Part VI.—Formation of 6-Hydroxy-4-(p-methylphenoxy)-2-oxo-1-phenyl Pyridine-3-carboxyanilides*

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(Received August 1, 1969, revised September 30, 1969)

6-Hydroxy pyridine-3-carboxyanilides (II), with varying substituent at N, (II, R=Ph, *o*, *m*, *p*-tolyl, benzyl, etc.) have been synthesised. The IR and UV spectra of the new products have also been recorded.

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COBALT(III) SULPHATE AS OXIDIZING TITRIMETRIC REAGENT

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(Received August 18, 1969; revised December 1, 1969)

In spite of the extremely high redox potential of cobalt(III)–cobalt(II) system (1.82 V in 4N HNO_3 solution), it has been used in a few cases as a titrant in analytical chemistry, simply for the reason of oxidizing water and itself being reduced to cobalt(II) state besides the difficulty in preparation and storage of the prepared solution. However, cobalt(III) sulphate electrolytically prepared in 8N sulphuric acid and kept at about —5°C has turned out to be fairly stable for a period of 3 months. It has been observed that 2–15N sulphuric acid, 2–8N hydrochloric acid, 10–12% perchloric acid and glacial to 60% acetic acid can be very safely used as media without any danger of cobalt(III) reduction by them. Quantitative determination of iodide alone and in the presence of chloride and bromide individually and collectively, nitrite alone and in the presence of nitrate, hydrogen peroxide and sodium peroxide have been made potentiometrically.

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ION EXCHANGE SEPARATION OF TRANSITION ELEMENTS OF THE PERIODIC TABLE. PART I

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(Received March 21, 1969; revised September 23, 1969)

The separation of the cations Ni^{++}, $Mn^{++}$and Co^{++} has been carried out using the ion exchange method. The mixture of these cations in 9N HCl is added to an anion exchanger and eluted with 6N NHCl to remove Co and Mn while Ni is not adsorbed at all. The concentration of the separated cations has been determined polarographically using the step-height-concentration calibration group method.[1]

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ION EXCHANGE SEPARATION OF TRANSITION ELEMENTS OF THE PERIODIC TABLE. PART II

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(Received March 21, 1969; revised September 23, 1969)

Copper, iron and zinc have been separated from one another by ion exchange method. A mixture of the three cations was run over an anion exchange resin and each cation was successively eluted with hydrochloric acid. The eluants were studied polarographically using step height-concentration calibration group method.

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PHASE EQUILIBRIUM STUDIES IN THE SYSTEM MgO–TiO_2 BY HOT STAGE MICROSCOPIC TECHNIQUE*

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(Received October 27, 1969)

Phase equilibria relations in the system MgO–TiO_2 were studied by means of hot stage microscope and X-ray techniques. The existence of three binary compounds in the system was confirmed. From the liquidus and solidus temperatures of compositions in the system an equilibrium diagram for the system was constructed.

SHORT COMMUNICATION
PHYSICAL SCIENCES SECTION

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CHEMICAL CONSTITUENTS OF CORCHOROUS OLITORIUS AND CORCHOROUS CAPSULARIS

Part I.—Identification of Sugars from the Roots and Seeds of the Jute Plants

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(Received November 20, 1969)

Biological Sciences Section

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STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

Part VIII*.—Isolation and Characterization of Penicillium martinsii Biourge Metabolic Products. The Structure of Amudol

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IZHAR H. QURESHY, (Miss) SHAHEEN A. HUSAIN, (Mrs.) NAJMA MURTAZA and (Miss) RADIA NOORANI

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ASAF ALI QURESHI

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(Received November 28, 1969)

Penicillium martinsii Biourge, grown on a semisynthetic medium, produces five crystalline compounds, viz., *amudol*, $C_7H_7O_3Cl$, m.p. 146–47°C; amudane, m.p. 219–20°C; amudene, m.p. 270–72°C; ergosterol, m.p. 165–57°C; and mannitol.

On the basis of chemical and spectral evidence amudol has been shown to be the hitherto undescribed 2,5-dihydroxy-4-chlorobenzyl alcohol. Amudol has been shown to have antibacterial properties.

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STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

Part IX.—Structure of Amudane, Amudene and Amujane Metabolic Products of Penicillium martinsii Biourge

AHMAD KAMAL, SHAHEEN A. HUSAIN, NAJMA MURTAZA, RADIA NOORANI, IZHAR H. QURESHI and ASAF A. QURESHI

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(Received February 4, 1970)

The structures of amudane (m.p. 219–220°C), amudene (m.p. 270–72°C) and amujane (m.p. 252°C), the metabolic products of *Pennicillium martinsii* Biourge, have been established to be griseofulvin $C_{17}H_{17}O_6Cl$ (m.p. 220–222°C), dehydrogriseofulvin $C_{17}H_{15}O_6Cl$ (m.p. 270–72°C) and dihydrogriseofulvin $C_{17}H_{19}O_6Cl$ (m.p. 196°C), respectively, through physical methods. Besides these, mannitol has also been isolated.

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STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

Part X.—Isolation, Structure and Stereochemistry of Yasimin and other Metabolic Products of Aspergillus unguis Emile-Weil and Gaudin

AHMAD KAMAL, YASMIN HAIDER, YAZDANA A. KHAN, I.H. QURESHI and A.A. QURESHI

P.C.S.I.R. Laboratories, Karachi 39

(Received February 6, 1970)

The structure of *yasimin* is shown to be tri-dechloronornidulin. The other three metabolites have been identified as nidulin, nornidulin and mannitol. These structures have been established mainly through physical methods.

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STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS

Part XI.—Isolation of Tajixanthone, Shamixanthone, Ajamxanthone, Shahenxanthone, Najamxanthone, Radixanthone and Mannitol from Mycelium of Aspergillus stellatus, Curzi

AHMAD KAMAL, SHAHEEN A. HUSAIN, RADIA NOORANI, NAJMA MURTAZA, I.H. QURESHI and ASAF A. QURESHI

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(Received February 13, 1970)

Isolation of six pigments are described: *tajixanthone*, m.p. 157–158°C, $C_{25}H_{26}O_6$; *shamixanthone*, m.p. 153–154°C, $C_{25}H_{25}O_5$; *ajamxanthone*, m.p. 132–134°C, $C_{25}H_{24}O_4$; *shahenxanthone*, m.p. 163–164°C, $C_{25}H_{28}O_7$; *najamxanthone*, m.p. 180–182°C, $C_{26}H_{28}O_8$; *radixanthone*, m.p. 202–203°C, $C_{26}H_{30}O_9$ and mannitol from *Aspergillus stellatus*, Curzi.

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STUDIES ON A PROTEOLYTIC ENZYME FROM WITHANIA COAGULANS DUNAL

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(Received June 25, 1969; revised October 23, 1969)

A proteolytic enzyme from fruits of *Withania coagulans* was isolated in a partially purified form and its properties studied. Evidence has been presented to suggest that the proteolytic activity is shown by the same milk-clotting enzyme, which had been obtained earlier from this source.

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THE METABOLISM OF ETHYL CARBONATE ESTER OF p-METHOXY-[U-^{14}C] PHENOL IN THE RAT

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(Received December 16, 1968; revised September 1, 1969)

The metabolism of ethyl carbonate ester of *p*-methoxy-[U-14C] phenol in the rat has been investigated. Ethyl carbonate ester of *p*-methoxy-[U-14C] phenol was synthesized from [U-14C] phenol and purified by thin layer chromatography on silica gel and finally by chromatography on silicic acid-celite column. The radioactive ester was fed to the rats and various tissues examined. About 0.08% of the administered dose was excreted in bile collected for 5 hr via a cannulation. *p*-Methoxy-[U-14C] phenol was very poorly absorbed in the animal tissues and also very quickly removed from them. Liver and intestine contained appreciable amount of radioactivity while heart and kidney did not contain much. **Ubliquinone isolated from tissue lipids did not contain any radioactivity.** The trapped carbon dioxide from the expired air was found to be nonradioactive. *p*-Methoxy-[U-14C] phenol was mainly excreted in a conjugated form in the urine. About 50% of the administered dose was found in the urine 9 hr after dosing.

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AMINO ACID COMPOSITION OF PROTEIN CONCENTRATE PREPARED FROM LEAVES OF SUSBANIA AEGYPTICA (JANTAR)

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(Received October 23, 1968; revised November 24, 1969)

Preparation of protein concentrate from the leaves of *Susbania aegyptica* (Jantar) is reported. Amino acid analysis of the product showed that it contains threonine, isoleucine, phenyl analine, lysine, methionine and tryptophane to the extent of 2.8, 4.65, 15.7, 7.75, 4.5 and 6.75% respectively, in addition to other amino acids. Feasibility of incorporation of these amino acids into cereal products is discussed. Of special importance are lysine and methionine, commonly lacking in cereals.

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BIOCHEMICAL AND NUTRITIONAL STUDIES ON INDIGENOUS COTTONSEEDS FOR THE PRODUCTION OF DETOXIFIED COTTONSEED FLOUR

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(Received August 28, 1969; revised December 8, 1969)

Free gossypol, total gossypol and available lysine content of certain varieties of indigenous cottonseed meats and meals has been determined with a view to prepare a detoxified cottonseed flour. Free gossypol which is responsible for the toxicity of cottonseed was found to range from 0.9 to 1.45% in meats and from 0.16 to 0.88% in meals. Available lysine ranged between 3.2 to 3.5 g/16g N in meats and 2.1 to 3.3/16 g N in meals which showed damage to protein quality in the latter due to processing.

Experiments were conducted for eliminating free gossypol by solvent extraction and by fixation with certain compounds. It was found that free gossypol could be eliminated more efficiently by ethyl alcohol (which is cheaply available in Pakistan) as compared with other solvent systems. Cottonseed meal containing less than 0.3% free gossypol could be detoxified by means of a mixture of calcium and iron salts but the product was of a dark colour and could possibly be used as animal feed.

Net protein utilisation value showed that edible cottonseed flour prepared by treatment with calcium and iron salts was slightly of better protein quality as compared with alcohol extracted flour.

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PROTEOLYTIC ENZYMES OF DESERT LOCUST SCHISTOCERCA GREGARIA (FORSKAL)

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(Received July 1, 1969; revised October 9, 1969)

Activity of proteolytic enzymes (peptic, catheptic and tryptic) was determined according to the method of Tomeralli *et al.*[41] in the alimentary canal of desert locust. Tryptic activity was found to be significant at pH 8.3. Protease activity was negligible in all the parts (whole and tissues) of the alimentary canal of the locust starved for 48 hr. It was significant in foregut, hepatic caecae and midgut of the locust starved for 12 hr. Protease activity was high in hepatic caecae and midgut tissue respectively. Aminopeptidase activity was significantly high in midgut and hepatic caecae while low in malpighian tubules. Dipeptidase activity was also significantly high in midgut, hepatic caecae and malpighian tubules while meagre in salivary glands.

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FIELD EVALUATION OF PETKOLIN FOR THE CONTROL OF APHIDS ON DIFFERENT CROPS

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(Received September 12, 1969)

Petkolin in the dose of 1 lb active ingredient per acre produced 97.6% mortality of black aphids on Santroza crop. Two lb of Petkolin killed about 90% population of aphids on mustard crop. Two lb of Petkolin controlled 85.5% population of aphids on peaches. Two lb ultra low volume concentrate of Petkolin checked 90% population on roses and 95% population on mustard crop.

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PLANT POPULATION STUDIES IN TRANSPLANT RICE

Part I.—Hill Density and Yield in Transplant Aman Rice

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(Received September 13, 1969; revised December 2, 1969)

Highest grain yield was not all the way associated with the highest plant population in transplant *aman* rice. 'Nigersail' variety when transplanted 3, 4, 5, 6, 7, 8, 9, and 10 in. apart with one seedling per hill in 10 and 12 in. apart rows, tended to give highest grain yield at within-row hill spacing of 5 in. although the grain yields of 3, 4, 5, 6, and 7 in. hill spacings were statistically identical. Grain yield tended to gradually decline as the within-row hill spacing increased or decreased from 5 in. While the grain yield in rice is proposed to be the joint function of (a) the average number of hills per unit area, (b) the average number of ears per hill, (c) the average number of grains per ear, and (d) the average weight of an individual grain, the straw yield is proposed to be joint function of (a) the average number of hills per unit area and (b) the average straw-weight of an individual hill. Formular expressions for these two crop characters—the grain yield, and the straw yield—have been proposed and discussed in the paper.

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EFFECT OF TYPES OF SEEDLING NURSERIES ON THE GROWTH-PHASE DURATION IN TEN RICE CULTIVARS GROWN AS TRANSPLANT AUS RICE

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(Received September 16, 1969)

Seedlings of ten different rice cultivars, namely, Dharial, Kataktara, Charnock, Dular, Marichbati, MIFB-322-1, Taichung (native) 1, IR8, IR5, and Peta were raised in three different types of seedling nurseries, 'normal', 'dapog', and 'floating; and the effect of types of seedling nurseries on the different phases of growth and their durations in transplant *aus* rice were studied. Five growth phases, viz. germination phase, active vegetative phase, lag-vegetative phase, active reproductive phase, and grain development and ripening phase, were recognized in IR5 and Peta only. The lag-vegetative phase was found absent in other eight cultivars. The floating nursery seedlings completed their active vegetative phase about a week earlier than the seedlings from the other two types of nurseries. The length of the total growth duration of floating seedlings was also 4 to 5 days shorter than those of seedlings of the other two types of nurseries. There was no practical difference between normal and dapog nurseries. The ten cultivars under study varied significantly in the durations of their different growth phases as well as in their respective total growth durations. The duration of the active vegetative phase appeared to be directly proportional to the length of the total growth duration, or vice versa. The total growth durations of the exotic cultivars were, in general, longer (121-176 days) than those (106-118 days) of the local ones.

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SOME APPLIED ASPECTS OF GIBBERELLIC ACID IN BARLEY AND WHEAT*

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(Received July 4, 1969; revised September 26, 1969)

Spraying of barley spikes, before grain development or at stages during seed maturation, with 500 ppm aqueous solution of gibberellic acid broke the characteristic seed dormancy of freshly harvested barley seeds. Seeds so obtained produced more vigorous seedlings than did the seeds from unsprayed spikes. In a preliminary pot trial, soaking of wheat seeds for 24 hr before seeding in 500 ppm aqueous solution of gibberellic acid showed an increase in yield of late sown wheat as compared to the yields obtained from dry-sowing and transplanting methods recommended for late sown wheat in West Pakistan.

Technology Section

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CERAMIC COLOURS

Part III.—Blue Stains

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(Received October 17, 1969)

Blue stains compounded of oxides of zirconium, vanadium and cobalt have been studied. Different shades of blue have been developed and optimum compositions and conditions have been established for the respective shades. The stains have been studied for use as underglaze colours, and also as in glaze stains.

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THE EFFECT OF BLEACHING ON THE DEGREE OF POLYMERISATION OF JUTE CELLULOSE

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(Received June 21, 1969; revised November 15, 1969)

Jute fibre was bleached with 0.7% sodium chlorite solution at pH 4. The effect of time, temperature of bleaching etc. on jute cellulose was investigated. In general bleaching affects degree of polymerisation of jute cellulose. The degree of polymerisation of cellulose obtained by bleaching jute was determined by viscosity measurements of the solution of nitro derivatives of the cellulose in each case. **It was observed that least change in D.P. of cellulose** from completely bleached jute takes place when bleaching is done within a temperature range of 65°C and 70°C. The time required for complete bleaching at this temperature is about 80 min.

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FELTING OF PAKISTANI WOOLS AND ITS RELATIONSHIP WITH MEDULLATION

MUMTAZ AHMAD KHAN

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(Received June 21, 1969)

Studies have been made on felting behaviour of a number of Pakistani wools. The possible factors which affect felting such as diameter, friction, fibre length, crimps/inch and crimp form have also been studied. It was found that Kaghani wool exhibited the lowest felting ability whereas Lohi wool the highest. It was also found that, in order to make a good felt, the percentage of true fibres should not be less than 60%, and conversely that of medullated fibres not more than 40%, provided the configuration of true fibres is sine and that of medullated fibres straight.

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MECHANISMS OF WOOL SHRINKAGE IN FABRIC, YARN AND LOOSE WOOL

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(Received July 12, 1969; revised, November 4, 1969)

Felting shrinkage in wool assemblies proceeds initially at a rapid rate followed by an extremely slow rate arising from two diverse mechanisms which are attributable to a difference in the degrees of freedom associated with fibre movement. In the initial rate, fabric shrinkage varies with crimp ratio, twist and cover factor in the diminishing order of their significance. It is also correlated with yarntex and tenacity. The analyses further reveal that wool felting at various stages of processing is governed by the same fibre characteristics which are, however, subject to interactions with assembly geometry. Besides, tightness of fabric structure may not be a cause of Shorter's mechanism in felting, although it increases fabric relaxation shrinkage.

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SCIENTIFIC GRADING OF JUTE

Part IV.—Determination of Copper Number and Nitrogen Content of Different Grades of Jute

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(Received November 20, 1969)

The copper number of different grades of white (*Corchorus capsularis*) and tossa (*Corchorous olitorus*) jute increases from higher to the lower grades of jute in each variety. Tossa has comparatively higher copper number value than white jute. Results show better grades have lower copper number values thus indicating that the reducing end groups are present in comparatively larger number in the inferior grades of jute. Nitrogen content of all varieties of jute appears to vary between 0.12 to 0.26% and do not show any clear distinction as to the grade or variety of jute.

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SCIENTIFIC GRADING OF JUTE

Part V.—Determination of Acetyl Content and Ash of Different Grades of Jute

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(Received November 29, 1969).

The acetyl value of white jute (*Corchorus capsularis*) has been found to be higher than that of tossa jute (*Corchorus olitorius*). The ash content of different grades of white and tossa jute has been found to increase gradually from higher to the lower grade of jute. Tossa variety has comparatively less ash content than that of corresponding white variety.