Special Paper

Short Communications:

PAKISTAN JOURNAL
OF
SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 11, No. 4 October 1968

CORRELATION OF THE EFFECTIVE ELECTRONEGATIVITY OF MOLECULES WITH VIBRATIONAL FREQUENCIES

M. ARSHAD A. BEG

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received March 13, 1968)

The vibrational frequencies of the various bonds are shown to be related to the overall electronic environment of the molecules given by their effective electronegativity. The various aspects of the changes in the electronegativity of molecules are discussed.

AN ALGEBRA OF NONLINEAR OPERATORS ON L^2 SPACES

NASIRUDDIN AHMED

Electronics Division, Atomic Energy Centre, Dacca

(Received May 18, 1967)

An algebra of a class of nonlinear operators (more general than those of Hammerstein) acting within the L^2 space is developed. It is shown that the algebra is closed under the operations of "addition", "scaler multiplication and product by composition".

CONSTITUENTS OF ERYTHREA RAMOSISSIMA (GENTIANACEAE). PART I

S.F. Hussain, M.I. Khattak and S.A. Warsi

North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

(Received March 20, 1968; revised April 25, 1968)

Three glucosides have been isolated as their acetyl derivatives which have been named as acetyl ramosin A, $C_{19}H_{30}O_2$, m.p. 137-80; acetyl ramosin B, $C_{23}H_{30}O_{12}$, m.p. 155-60; and acetyl ramosin C, $C_{23}H_{32}O_{14}$ A hydrocarbon most likely nonacosane and β-sitosterol have also been isolated.

STUDIES IN INTRAMOLECULAR INTERACTION OF AROMATIC NITRO GROUP WITH ORTHO SIDECHAIN

Part 1.—A New Synthesis of Quinoline N-Oxide Derivatives

YUSUF AHMAD[1] and SHAMIM AHMAD SHAMSI

Chemical Research Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received September 5, 1968)

o-Nitroveratrylidenesuccinic acid (III), a nitrobenzene derivative with an active methylene group in its *ortho* side-chain, has been cyclised with the help of aqueous alkali to give directly an *N*-oxide of a quinoline derivative, $C_{12}H_{11}NO_5$. Its structure has been proved to be 3-carboxy-6,7-dimethoxyquinoline 1-oxide(Va), through its rearrangement with acetic anhydride to 2-hydroxy-6,7-dimethoxyquinoline-3-carboxylic acid*(VIa), which has been synthesised by an unambiguous route.

STUDIES IN THE SANTONIN SERIES

Part II.—The Nitration Products of Desmethyldesmotroposantonins

MUHAMMAD RIAZ, ZIA-UD-DIN, and IFTIKHAR AHMAD

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received November 23, 1967; revised April 3, 1968)

Nitration of 6β(H), 11β(H)-desmethyldesmotrosantonin (I) gave the 2-nitro-6α(H), 11β(H) derivative (II), which on acetylation with Ac_2O and H_2SO_4 gave compounds III. The nitro acetate of III was also obtained by acetylation with Py and Ac_2O. The 6 β(H),11α(H)-desmethyldesmotroposantonin (IV) obtained by K_2CO_3 and xylene isomerisation of II, on nitration, gave 2-nitro-6α(H),11α(H) derivative (V). Nitration thus gave only two isomers.

STUDIES ON CARBOXYMETHYLCELLULOSE

Part V.—Carboxymethylation and Properties of the Products

M.H. KHUNDKAR, MEFTAHUDDIN MAHMUD and A.H.M.M. RAHMAN

Department of Chemistry, Dacca University, Dacca

(Received March 16, 1968)

Carboxymethylation increases the degree of substitution in all the different types of celluloses. While after *four* successive treatments the value for cotton and wood pulp still shows an upward trend, that for jute tends to a limit. Use of wet products in the successive treatments (rather than drying it after each treatments) gives much better results. **In *four* treatments with jute and cotton, the degree of substitution (D.S.)** of the products were respectively 2.61 and 2.63; but cotton gave a high value of 2.88 after the fifth treatment.

Detergent properties were studied by measuring lowering of surface tension. This and other physical properties are discussed.

STUDIES IN THE BIOCHEMISTRY OF MICROORGANISMS*

Part VII.—Terrein and Kojic Acid, Metabolic Products of Aspergillus stellatus Curzi

IZHAR HUSAIN QURESHI, AHMAD KAMAL† (Miss) RADIA NOORANI, (Miss) SURRIAYA AZIZ‡ and (in part) (Miss) SHAHEEN A. HUSAIN

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received May 10, 1968)

Aspergillus stellatus Curzi, is shown to produce terrein (I) and kojic acid (II). Conditions favourable for the production of metabolites (I) and (II) are described.

STUDY OF AN ACTIVE AEROBIC JUTE RETTING BACTERIUM

A.C. Biswas

Jute Research Institute, Tejgaon, Dacca

(Received June 16, 1966; revised September 5, 1968)

Among different types of rod-shaped, spore forming bacteria isolated from jute retting water *Bacillus sphaericus* showed retting ability under laboratory conditions. Its physiological-cultural behaviour and ctaion on jute stem has been studied in detail.

ESTERASE ACTIVITY OF THE BERRIES OF WITHANIA COAGULANS DUNAL

Part I.—Kinetic and Inhibition Studies of Esterase I

RASHEED BAKHSH QADRI and MUKHTAR AHMAD WAHID

Biochemical Research Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received December 18, 1967)

The pulp of the berries of *Withania coagulans* contains an esterase enzyme (esterase 1), the optimum pH of which is 8.5. Its Michaelis and Menten constant is 8.5×10^{-5} M for *p*-nitrophenyl acetate. Inhibition experiments show that the esterase I most probably contains SH groups as an integral part of the active centre of the enzyme.

EFFECT OF NITROGEN SOURCES ON THE PRODUCTION OF α-AMYLASE

EHSAN ILAHI QURESHI and MUHAMMAD AFZAL MALIK

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received November 14, 1967)

Aspergillus oryzae IMI 17299 was used to find out the effect of nitrogen sources on the production of α-amylase. The organism was grown in basal starch-ammonium sulphate-salts medium, in 300-ml flasks on a rotary shaker at 30°C. α-Amylase activity in the culture filtrate was determined spectrophotometrically. Ammonium sulphate in the medium was replaced by various inorganic, organic nitrogenous compounds and industrial by-products. Of the various inorganic nitrogenous compounds used, ammonium sulphate gave maximum amylase production 9.36 units/ml, NH_4NO_3, $NaNO_3$, K NO_3, gave 8.87, 6.05, 7.09 units/ml culture filtrate, respectively. In the case of organic compounds and by-products, maximum amylase production was achieved at 96 hr. Peptone gave maximum amylase production 15.80 units/ml; caseitone and yeast extract gave 14.44 and 14.80 units/ml culture filtrate, respectively. Urea behaved like inorganic compounds and showed low amylase production 7.70 units/ml. Cornsteep liquor, an industrial by-product, gave the highest amylase production (22.26 units/ml) among all nitrogenons compounds tried in these experiments. Distiller soluble showed poor amylase production.

IMPROVED N-BROMOSUCCINIMIDE METHOD FOR ESTIMATION OF ASCORBIC ACID IN FOOD PRODUCTS

NAZAR MOHAMMAD, M.Y. IKRAMUL HAQ and A. F. M. EHTESHAMUDDIN

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received February 27, 1968; revised April 20, 1968)

The titrimetric method of ascorbic acid determination by *N*-bromosuccinimide is unreliable in the presence of sulphites. During the titration, the sulphites get oxidised by *N*-bromosuccinimide along with ascorbic acid with the result that higher values for the vitamin are obtained. A method for the elimination of sulphite by means of formaldehyde is described.

NUTRITIONAL PROPERTIES OF SESAME FLOUR PREPARED FROM INDIGENOUS SESAME SEED CAKE

MOHAMMAD AWAIS,* IFTIKHAR ALI SHAIKH and S. MAQSOOD ALI

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received February 12, 1968; revised March 30, 1968)

Sesame flour was prepared from sesame seed cake locally available. Protein content and net protein utilization value (NPU_{st}) of the flour were 42.5% and 44.6%, respectively. NPU of the flour was improved by supplementation. Two blends:(1) containing sesame flour, Bengal gram flour and fish protein concentrate (NPU_{st} 86.3), and(2) containing sesame flour, Bengal gram flour and skim milk powder (NPU_{st} 78.5) were prepared. These were found excellent supplements to indigenous cereals.

CONTRIBUTION TO SOIL FUNGI OF WEST PAKISTAN

Part 1.—Karachi

AHMEDUNNISA, S. IFTIKHAR AHMED and NISHAT RIZVI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received March 14, 1968)

Soil fungi from three places, namely, Nursery of Central Laboratories, plot of land at the back of the Botany Section of Central Laboratories and Block A of North Nazimabad (Karachi) were studied. The media used were Czapek's agar and potato dextrose agar with Rose-Bengal in a ratio of 1:30,000. For the isolation of these fungi, Warcup and Streaking techniques were employed.

CRITICAL OXYGEN LEVEL FOR THE RESPIRATION OF MUSA SAPIENTANUM VARIETY GROS MICHEL*

M.H. Quazi† and H. T. Freebairn

University of Houston, Houston, Texas, U.S.A.

(Received May 10, 1968)

Different samples of bananas were separately exposed to a series of low oxygen concentrations of 0.5%, 1.0% and 2.5%. The rates of respiration exhibited by fruits exposed to 0.5% and 1.0% oxygen was greater than that in 2.5% oxygen during the first 50 hrs of the experiment. Qualitatively, however, all the three samples exhibited similar patterns of respiration. After this initial period, the rate of respiration in 0.5% and 1.0% oxygen became constant, whereas the rate of respiration of the fruit exposed to 2.5% oxygen gradually increased. The increased rate of respiration at sub-threshold oxygen levels (0.5% and 1.0%) was attributed to the combined effect of anaerobic and aerobic respiration. It was concluded that the "critical oxygen level" for the respiration of bananas was close to 2.5% oxygen and existed during the initial hours of the experiment alone.

NEOBLEDIUS KARACHIENSIS, A NEW GENUS AND SPECIES OF THE OXYTELINAE (COLEOPTERA: STAPHYLINIDAE) FROM WEST PAKISTAN*

MOHAMMAD ABDULLAH and NOORUN-NISA QADRI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received March 29, 1968)

A new genus (*Neobledius* **gen. n.**) and species (*N. karachiensis* **sp. n.**) of the Oxytelini is described from four males in the Karachi University collection.

THE CHRYSOMELIDAE, COLEOPTERA OF PAKISTAN

Part III.—A Key to the Genera and Species of the Galerucinae, with Descriptions of New Genera and Species

MOHAMMAD ABDULLAH* and (Miss) SHAMEEM SAEED QURESHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received March 29, 1968)

Keys (with distinguishing characters) are provided for the genera and species of the Galerucinae of West Pakistan and East Pakistan. Information on their economic importance is also given. New taxa proposed from West Pakistan are: *Aulacophora naseemi* **sp. n.**, *Neoatysa* **gen. n.**, *N. shahidi* **sp. n.**, *Neoclitena* **gen. n.**, *N. simplex* **sp. n.**, and *Neosastra* **gen. n.**, *N. murreeiensis* **sp. n.** *Diorhabda lusca* Maulik, 1936 is a **new record** for West Pakistan.

THE SCARABAEIDAE, COLEOPTERA OF PAKISTAN

Part IV.—Adoretini (Rutelinae) with Descriptions of Eight New Species of Adoretus from West Pakistan

MOHAMMAD ABDULLAH* and (MISS) ROSHAN ARA ROOHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received April 3, 1968)

Keys (with distinguishing characters) are presented for the identification of the genera and species of the Adoretini found or likely to be discovered in East and West Pakistan. Information on their host plants is also included. New species of *Adoretus* Cast., 1840 described from West Pakistan in the collection of the University of Karachi, Tandojam Agricultural College and West Pakistan Agricultural University at Lyallpur are: *A. tufaili* Abdullah **sp. n.**, *A. atiqi* Abdullah **sp. n.**, *A. saleemi* Abdullah **sp. n.**, *A. fatehi* Abdullah **sp. n.**, *A. ismaili* Abdullah **sp. n.**, *A. baquari* Abdullah **sp. n.**, *A. iftikhari* Abdullah **sp. n.**, and *A. naeemi* Abdullah **sp. n.**

A NEW GENUS AND SPECIES OF THE GALERUCINAE (COLEOPTERA: CHRYSOMELIDAE) FROM PEAR TREE IN WEST PAKISTAN

MOHAMMAD ABDULLAH and (Miss) SHAMEEM SAEED QURESHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received April 17, 1968)

A new genus (*Abdullahius* **gen. n.**) and species (*A. shameemae* **sp. n.**) has been described from material collected on pear tree (*Pyrus communis* L.) in Dobi, West Pakistan, now deposited in the West Pakistan Agricultural University at Lyallpur.

ASHRAFIA ANWARULLAHI, A NEW GENUS AND SPECIES OF THE GALERUCINAE (COLEOPTERA: CHRYSOMELIDAE) FROM WEST PAKISTAN

MOHAMMAD ABDULLAH and (Miss) SHAMEEM SAEED QURESHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received April 17, 1968)

A new genus (*Ashrafiia* **gen. n.**) and species (*A. anwarullahi* **sp. n.**) of the galerucine beetle group characterized by having all claws appendiculate, wings present, elytral punctures confused, prothorax not elongated, and pronotum without depression is described from West Pakistan. The genus is in certain anatomical respects related to *Kanarella* Jacoby, 1896.

THE DUNG-ROLLERS OF PAKISTAN WITH OBSERVATIONS ON THE GENUS ANOMALA INCLUDING THE ECONOMIC IMPORTANCE AND DESCRIPTIONS OF NEW SPECIES FROM KARACHI (COLEOPTERA: SCARABAEIDAE)

MOHAMMAD ABDULLAH and (Miss) ROSHAN ARA ROOHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received April 30, 1968)

Distinguishing characters and keys to the identification of the families (Lucanidae, Passalidae, Trogidae, Acanthoceridae, Geotrupidae and Scarabaeidae) of the superfamily Scarabaeoidea, the subfamilies (Ochodaeinae, Chironinae, Orphninae, Hybosorinae, Scarabaeinae=Coprinae, Aphodiinae, Dynastinae, Cetoniinae, Desmonychinae, Hopliinae, Rutelinae, Euchirinae and Melolonthinae) of the family Scarabaeidae, the tribes (Adoretini, Peltonotini, Parastasiini, Anomalini and Adorrhinyptiini) of the subfamily Rutelinae, the genera (*Rhinyptia, Tropiorrhynchus, Callistopopillia, Dactylopopillia, Popillia, Trichanomala, Spilopopillia, Mimela* and *Anomala*) of the tribe Anomalini, and 39 species of the section VI of the genus *Anomala*, 14 species of West Pakistan and 59 species of East Pakistan are given. Three **new species** (*A. ashrafii, A. qadrii* and *A. shafqati*) are described from Karachi. Tables summarizing the host plant records of *Anomala* species and their seasonal distribution are also included.

A KEY TO THE SPECIES OF THE ANOMALINI (RUTELINAE) OF PAKISTAN WITH REDESCRIPTION OF MIMELA HORSFIELDI HOPE (COLEOPTERA : SCARABAEIDAE)

MOHAMMAD ABDULLAH and (Miss) ROSHAN ARA ROOHI

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received April 30, 1968)

Keys (with distinguishing characters) for the identification of the species of the Anomalini of West and East Pakistan are presented along with the redescription of a male of *Mimela horsfieldi* Hope, 1836 from Jangshahi, Sind—a **new record.**

STUDY ON THE PATHOGENECITY OF PYTHIUM VEXANS DE BARY, PHYTOPHTHORA SPP. AND PHYTOPHTHORA CACTORUM

SORAYA AZEEM

Department of Botany, University of Karachi, Karachi

(Received November 17, 1967; revised February 7, 1968)

Pythium vexans De Bary, *Phytophthora spp.* and *Phytophthora cactorum* were compared for pathogenecity on carnations (*Dianthus caryophyllus*) variety Red Sim. *Phytopthora spp.* was most pathogenic followed by *Phytopthora cactorum* and *Pythium vexans.* Several methods of testing pathogenecity were used in the green house. One method in which the inoculum from potato dextrose agar was blended with sterile water and poured in the vicinity of root zone, gave the best and consistent result in repeated tests.

BOTTOM FAUNA OF THE STREAMS OF KOHAT DISTRICT AND KURRAM AGENCY AFTER WINTER RAINS

S. Rashid Ali

Zoology Department, Gordon College, Rawalpindi

(Received January 4, 1968; revised February 5, 1968)

The productivity of the bottom fauna of the streams of Kohat district and Kurram Agency has been determined by number and weight per unit area after winter rains and it has been compared with that of the ponds of the same areas. The productivity of bottom fauna is high in some of the streams while it is usually high in all ponds. More than 50% of fishes live on bottom organisms.

OVICIDAL AND LARVICIDAL ACTIONS OF PETKOLIN AGAINST RED SPIDER MITES (ACARINA:TETRANYCHIDAE)

(Mrs.) Tasneem Ahmed and M. Anwarullah

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received March 20, 1968)

Toxicity of Petkolin A, Petkolin M and Petkolin S has been studied in the Laboratory against eggs and larvae of red spider mites, ***Tetranychus telarius*** **(L.).** Results were compared with other standard chlorinated acaricides such as Aramite [2-(*p*-t-butylphenoxy)isopropyl-2-chloroethyl sulphite), Chlorobenzilate (ethyl 4,4′-dichlorobenzilate), and Ovex (*p*-chlorophenyl-*p*-chlorobenzene sulphonate).

STUDIES IN THE PROCESSING AND UTILIZATION OF GREASE-LIKE WASTE PRODUCT FROM THE EPHEDRINE PLANT OF MARKER ALKALOIDS, QUETTA

G. Mustafa Ali and Riaz Ahmad

Paints and Plastics Research Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received June 16, 1966; revised June 15, 1968)

A grease-like tacky product of greenish black colour is obtained as a by-product in considerable quantities (1500—2000 lb per month) at the Ephedrine Processing Plant of Marker Alkaloids, Quetta. The greasy nature and high acetyl number led to the processing of this material with a view to get products of industrial utilization in wax-based compositions. Methods of processing and the characteristics of the resulting products have been described in detail. Possible uses of such products have also been suggested in this paper.

STUDIES ON FLUIDISATION OF PAKISTAN COALS: SOME EFFECTS OF SIZE OF PARTICLES AND VISCOSITY, DENSITY AND VELOCITY OF GAS

M. Naseem Ahmed, M. Himayatullah and Ibrahim Khan

Fuel Research Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

(Received December 31, 1965; revised April 16, 1968)

Experiments in tubes up to 5.5 inches in diameter have been carried out with a number of gases to examine the factors which determine the state of fluidisation of beds of coal and the gas velocities required to fluidise beds of particles of various sizes within the range -10+100 B.S. mesh. The linear gas velocity required has been found to be inversely proportional to the absolute viscosity of the gas and independent of its density. It is proportional to the density of the solid. Though a definite relationship between fluidising and critical velocity is not proposed, the results indicated that any such relationship must take particle size into account.

DEVELOPMENT OF AVENTURINE GLAZES

SHAKIL AHMAD and M.R. ARIFF

Glass and Ceramics Division, West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

(Received February 3, 1968)

Aventurine glazes, using Pakistani raw materials in their formulation have been developed. The covered(a) variation in RO group (Na,K,Ca and Pb), (b) variation in R_2O_3 group (B_2O_3, Al_2O_3 and Fe_2O_3), (c) variation in RO_2 (SiO_2) and effects of application and firing techniques of glazes. The glazes were fired up to 1000° C. Some good Aventurine glazes (containing Fe) were obtained and conditions that affect the results were also established.

CHROMATOGRAPHIC STUDIES ON THE AMINO ACID COMPOSITION OF KAGHANI WOOL FIBRES

ARJAMAND KHAN

North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

M.S.H. SIDDIQI*

Department of Chemistry, University of Peshawar, Peshawar

(Received September 3, 1965; revised June 29, 1968)

The amino acids of a representative sample of Kaghani wool fibres have been determined quantitatively by using ion-exchange and paper chromatographic techniques. The fineness or diameter of true, heterotypical and medullated types of wool has been measured and the relationships between the characteristics investigated.

STUDIES ON SOME BASIC ASPECTS OF RECOVERY OF WOOL GREASE IN PAKISTAN

TAUFEEQ KHAN, GHULAM NABI and S.M.A. SHAH

North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

(Received February 17, 1968; revised April 19, 1968)

Grease contents of indigenous wools together with the physico-chemical constants of the grease have been estimated. The increase in the grease content resulting from cross-breeding between indigenous and foreign sheep breeds has been investigated, keeping in view the possible influences of wool fineness and environment. Waste wool scouring liquors from woollen mills have also been tested for their grease contents. Cross-breeding in moderate to cold regions and the treatment of imported raw wool render grease recovery a practical proposition.

FREE IRON OXIDE CONTENT IN EAST PAKISTAN SOILS

M.S. Hussain

Department of Soil Science, Dacca University, Dacca 2

(Received October 4, 1967; revised March 16, 1968)

A review of the literature on the free Fe_2O_3 content in some major soil groups of East Pakistan indicates that the amount of free Fe_2O_3 varies within wide limits. The free Fe_2O_3 content in these soils are rather low compared to its location in the humid Tropics. Red soils of Dacca have the highest amount of free Fe_2O_3 while the soils located on the Barind Tract has the lowest amount. In almost all the soils there is a downward enrichment of free Fe_2O_3 which is a clear sign of the Podzolic nature of these soils. While the downward movement of free Fe_2O_3 is true, no author as yet has put forward any suggestion about the possible mechanism of their movement. In this article the mechanism of movement of iron in soils has been discussed.

Special Paper

A STUDY OF PROCEDURES OF SELECTING AND CHANNELIZING SCIENTIFIC TALENT FOR RESEARCH AND DEVELOPMENT. PART II

M.M. Qurashi

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

SHORT COMMUNICATION

BUXPAPININE, A NEW ALKALOID FROM BUXUS PAPILOSA

M. IKRAM, G. A. MIANA, F. SULTANA AND F. MAHMUD
North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

(Received June 15, 1968; revised August 28, 1968)

ORIENTATION IN THE MANNICH REACTION

G.A. MIANA AND A. KARIM BHATTI*
North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

(Received June 29, 1968; revised August 13, 1968)

A STUDY OF THE PHASE COMPOSITION OF ZIARAT LATERITES

FAZAL MUHAMMAD
North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

(Received July 25, 1967; revised November 14, 1967)