ISSN 0030-9885
Coden: PSIRAA 33(3)73-126(1990)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 33, No. 3, March 1990

Published monthly by

Scientific Information Centre
PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

CATIONIC TERPOLYMERIZATION OF STYRENE α-METHYL STYRENE AND β-PINENE

A. RASHEED KHAN AND TEHZEEB AKHTAR

PCSIR Laboratories Complex, Off University Road, Karachi-39, Pakistan

(Received October 26, 1989; revised March 24, 1990)

The terpolymerization of styrene, α-methylstyrene and β- pinene has been carried out at 10-12° using anhydrous $AlCl_3$ as initiator and toluene as diluent. It has been observed that the three monomers polymerize simultaneously and form terpolymer in all monomeric ratios. The terpolymer contains molecular units of three monomers incorporated into each terpolymer molecule. The terpolymers of 2800-4800 molecular weight are obtained. It is yellowish brown transparent resinous material soluble in most of organic solvents that softens at 81-82°. The refractive index of terpolymer sample is 1.4940-1.4945. It may be used as tackyfying agent in the preparation of adhesives.

Key words: Terpolymerization, Monomers, Resinous material.

Pak. J. sci. ind. res., vol. 33, no. 3, March 1990

SOME NEW ASYMMETRICAL PYRIDYL-SUBSTITUTED PYRAZINE AND QUINOXALINE LIGANDS FOR COPPER AND IRON

M.Y. KHUHAWAR* AND W.I. STEPHEN

Department of Chemistry, The University, P.O. Box 363, Birmingham B15, 2TT, U.K.

(Received September 27, 1989; revised March 14, 1990)

The work reports the preparation of seven new pyridyl- substituted quinoxaline, dihydropyrazine and pyrazine ligands containing cuproin and ferroin functionalities. The absorptiometric properties of their reactions towards copper and iron have been studied. The reagents 2-(2'-pyridyl)-3-[2"-6"- methylpyridyl)]quinoxaline(V) and 2-(2'-pyridyl)-3-[2"-6- methylpyridyl)]-6-methylpyrazine (XI) for copper and 2-(2'-pyridyl)3-[2"-(6"-methylpyridyl)]-5,6-dihydropyrazine (VI) and 2- (2'-pyridyl)-3-(2"-(6"-methylpyridyl)]-5-methyl-pyrazine (X) are investigated for their possible use for the simultaneous determination of copper and iron in a single aliquot.

Key words: Pyrazine, Quinoxaline, Chromogenic reagents.

Pak. j. sci. ind. res., vol.33, no.3, March 1990

INFLUENCE OF ALUMINIUM CHLORIDE ON NITRIFICATION IN PEAT*

R. MANDAL AND J.W. PARSONS

Department of Soil Science, University of Aberdeen, Aberdeen, AB9 2UE, Scotland, U.K.

(Received October 31, 1989; revised April 2,1990)

The effect of aluminium on ammonification and nitrification was studied in a series of incubations of peat with and without added $(NH_4)_2SO_4$. Addition of $AlCl_3$ (0, 200, 400, 600 µg Al g^{-1}) caused a nonsignificant increase in NH_4-N up to 25 days of incubation in the absence of $(NH_4)_2SO_4$ and the release followed by immobilization of NH_4-N in the presence of applied $(NH_4)_2SO_4$. Similarly a significant change in nitrification occurred after 25 days of incubation and was found to be a function of NH_4-N concentration. Aluminium upto 200 µg g^{-1} peat appeared to stimulate nitrate production but the successive increments resulted in partial suppression (5-14%) of nitrification. Greatest inhibition (14%) was caused by the highest level of aluminium. Results showed that added $AlCl_3$ had no significant toxic effect on ammonification. Change in pH at 60 days of incubation was controlled but did not change significantly.

Key words : Aluminium chloride, Nitrification, Peat.

Pak. j. sci. ind. res., vol. 33, no.3, March 1990

DETERMINATION OF LEAD AND CADMIUM IN PULSES AND CEREALS BY ATOMIC ABSORPTION SPECTROPHOTOMETRY

S. RAHMAN, N. KHALID, R. AHMED AND I. H. QURESHI

Nuclear Chemistry Division, Pakistan Institute of Nuclear Science and Technology, P.O. Nilore, Islamabad, Pakistan.

(Received July 24, 1989., revised March 5, 1990)

In the present investigation the lead and cadmium concentrations were determined in different varieties of pulses and cereals by electrothermal atomic absorption spectrophotometric technique. Milling of cereals increased the concentration of these elements in flour samples as compared to the respective grains. Pulses contained higher concentration of lead (average 452 ng g^{-1}) than that of cereals (wheat, rice, corn) (average 236 ng g^{-1}) whereas the cadmium concentration was higher in cereals (average 75 ng g^{-1}) as compared to pulses (average 17 ng g^{-1}). In cereals rice contained higher concentration of lead. The results obtained from the present study were compared with the reported values from other countries. Intake of lead and cadmium through pulses and cereals was calculated and was found to be below the recommended tolerance levels of WHO.

Key words: Lead, Cadmium, Electrothermal atomic absorption spectrophotomerty, Pulses, Cereals, Daily intake.

Short Communication

Pak. j. sci. ind. res., vol. 33, no. 3, March, 1990

A RESEARCH NOTE ON THE PHOSPHORUS SOLUBILITY BY ELECTRO ULTRAFILTRATION (EUF) OF SOME ROCK PHOSPHATE MATERIALS

MUHAMMAD IQBAL MAKHDUM AND M. NAWAZ A. MALIK

Central Cotton Research Institute, Multan, Pakistan

(Received February 3, 1989; revised March, 1990)

Short Communication

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

SALT EFFECT ON THE SEPARATION OF XYLENE ISOMERS

S. AKHTAR HUSSAIN ZAIDI

Fuel Research Centre, PCSIR, Karachi, Pakistan

(Received September 5, 1989; revised March 25, 1990)

The salt effect in terms of the electrostatic energy between an ion and dipole interaction is given by the expression (1)

Biological Sciences Section

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

THEORETICAL APPROACH TO LIFE PROCESSES
Part–V. Postulates of the Hypothesis on Aging

MIRZA ARSHAD ALI BEG
PCSIR, Karachi-74400, Pakistan

(Received April, 25 1989; revised March 31, 1990)

Postulates of the hypothesis on aging are presented. They concern the roles of water as the input for and output of life processes. As the input it is needed directly to maintain an appropriate degree of hydration, to act as a carrier of nutrients, a medium or substrate for enzymic reactions and to maintain a heat and product balance on the product side and indirectly as a nutrient. The key mechanism for propagation of life processes is oxidative dehydration meaning dehydration accompanied by oxidation, whereby one of the output is water, generated (1) as a metabolic product, (2) as a by product due to disturbance in the micro- environment and (3) as a medium governing the electrolytic balance and enzymic substrate.

The above reactions, roles and functions of water have been discussed to suggest that biological reactions take place in the micro- environment at the sub-cellular level. It is hypothesised that reduction in the degree of hydration and/or a disturbance in the micro- environment create stress situations, generate stress metabolites including water and a hydrophobic material, create a diffusion barrier to the membranes, reduce the enzymic activity etc. and thus the process of aging surfaces up.

Key words: Aging, Oxidative-dehydration, Water, Nutrient carrier, Hydrogen bonding network, Micro-environment.

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

TRIDEMORPH AS AN INHIBITOR OF STEROL BIOSYNTHESIS IN WHEAT AND MAIZE

IQTIDAR A. KHALIL* AND E.I. MERCER

Department of Biochemistry, University College of Wales, Aberystwyth, Dyfed SY23 3DD, U.K.

(Received April 8, 1989; revised April 14, 1990)

The effect of the systemic fungicide, tridemorph (Calixin, BASF), on the growth and sterol biosynthesis of wheat (*Triticum aestivum* L.cv. "Aquila") and maize (*Zea mays* L. cv. "Brutus") seedlings grown in pots was studied to assess its phytotoxicity. A soil drench of 250 μM tridemorph depressed the growth of the shoot, primary leaves and root of both crop plants but increased the dry matter content. It also caused the Δ^5-sterols, normally the most abundant, to be largely replaced by 9β,19-cyclopropyl sterols. This strongly indicated that tridemorph inhibits the enzyme cycloeucalenol-obtusifoliol isomerase.The presence of smaller amounts of unusual Δ^8-sterols in the treated plants indicated that tridemorph also inhibits the sterol Δ^8--> Δ^7 isomerase. At the lowest concentration tested, namely 5 μM, tridemorph was not phytotoxic.

Key words: Tridemorph, Phytosterols, Inhibition, Cycloeucalenolobtusifoliol isomerase

Pak. j. sci. ind. res.,vol.33, no. 3, March 1990

ISOTOPIC AND NON-ISOTOPIC ESTIMATIONS OF FERTILIZER NITROGEN UPTAKE BY WHEAT

A. HAMID AND M. AHMAD

Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan

(Received September 7, 1989; revised March 11, 1990)

Recoveries of fertilizer N in wheat (cv. Mexi Pak-65) grown in a field experiment were calculated by:(i) difference method; (ii) linear regression of total N in wheat plant on rates of applied N; (iii) ^{15}N method; and (iv) linear regression of fertilizer N uptake on rates of labelled fertilizer.

The difference method overestimated recoveries of applied fertilizer N (in grain) 92, 75 and 64% at three rates of application when compared to the ^{15}N method. Similarly linear regression of total N in wheat on rates of N over estimated recoveries by 25% at the three rates of application when compared to linear regression of fertilizer N in wheat on rates of ^{15}N labelled fertilizer.

The difference method of calculating the recoveries of fertilizer N in wheat could give values similar to those calculated by ^{15}N method when the minimal N treatment was used as a base instead of zero-N.

Key words: Wheat, N recovery, ^{15}N laballed fertilizer.

Pak. j. sci. ind. res., vol. 33, no.3, March 1990

OCCURRENCE AND ABUNDANCE OF FOUR COMMERCIALLY IMPORTANT PENAEID POST LARVAE IN THE ESTUARINE WATERS OF SATKHIRA, BANGLADESH

NURUDDIN MAHMOOD AND MOHAMMAD ZAFAR

Institute of Marine Science, University of Chittagong, Chittagong 4331, Bangladesh

(Received April 13, 1989; revised March 11, 1990)

Till now wild penaeid postlarvae are the only source of seed supply and stocking material for the coastal brackishwater aquaculture ponds in Bangladesh. A year round investigation between June 1982 and May 1983 revealed that immigration of penaeid postlarvae takes place throughout the year in the estuarine waters in the vicinity of aquaculture farms of Satkhira. They were most abundant during monsoon (May-August), the maximum density (539 indivs./100m^3) was recorded in July and the minimum (16 indivs/100m^3) in March. The larval community of penaeid shrimps of this area was dominated by few species, *Metapenaeus monoceros* (51.05%), *Penaeus monodon* (14.75%), *Metapenaeus brevicornis* (3.02%) and *Penaeus indicus* (0.5). Their temporal and spatial distribution in the estuarine waters have been recorded.

Key words: Penaeid postlarvae, Immigration, Estuary.

Short Communication

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

EFFECT OF THREE NEMATICIDES ON POPULATION DENSITY OF TWO PLANT PARASITIC NEMATODES AND YIELD OF OKRA

ALY KHAN, S. SHAHID SHAUKAT* AND M. ASLAM

Crop Diseases Research Institute, PARC, Karachi University Campus, Karachi, Pakistan

(Received November 20, 1989; revised March 12, 1990)

Short Communication

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

EVALUATION OF CHICKPEA GENOTYPES FOR BIOLOGICAL NITROGEN FIXATION POTENTIAL

HAIDER KHAN, AZHAR MASHIATULLAH, NOORUL HASSAN, MAHMOOD AND MUHAMMAD MOHSIN IQBAL

Nuclear Institute for Food and Agriculture, Tarnab, Peshawar, Pakistan

(Received October 7, 1989; revised March 30, 1990)

Technology Section

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

STUDIES ON THE FIXED OIL OF THE SEEDS OF *ALBIZIA PROCERA*. *Part III*

MUNIR AHMED, F. M. CHAUDHARY AND M. BASHIR
PCSIR Laboratories Complex , Lahore-54600, Pakistan

(Received December 10, 1989)

A fixed oil to the extent of 4.9% has been extracted from the seeds of *Albizia procera* which belongs to the family Leguminosae. Its physical properties, neutral lipid fractions, fatty acid composition and vitamin A and B contents have been studied. The oil is found to countain myristic (0.34%), palmitic (20.49%), stearic (10.22%), arachidic (3.29%), behenic (6.81%), lignoceric (1.48%), palmitoleic (2.58%), oleic (22.45%), linoleic (28.13%), linolenic (2.40%), and behenoleic (1.8%) acids. The vitamin A is found to be 24 I.U while vitamin D 2 I.U.

Key words: Fixed oil, Fatty acids, Esterification.

Pak. j. sci. ind. res., vol. 33, no. 3, March 1990

EVALUATION OF REGENERATED NICKEL CATALYST *Part-IV*

M. YAQUB RAIE, MANZOOR AHMAD, MUHAMMAD ASHRAF AND S.A. KHAN*

PCSIR Laboratories Complex, Lahore-54600, Pakistan

Received November 11, 1989; revised , April 6, 1990)

The soybean oil after hydrogenation by the local and the imported catalyst shows saturated fatty acids (32.8%) and (34.4%) whereas unsaturated fatty acids (67.2%) and (65.6%) respectively. Secondly the clearity, bleachability, filtration time, iodine value and melting point of hydrogenated oil are the same either with the imported or the locally prepared nickel catalyst from the spent nickel catalyst.

Key words: Extended surface, Nickel catalyst, Spent nickel.

Pak. j. sci. ind. res., vol. 33, no. 3 , March 1990

USE OF COMMERCIAL GRADE SULPHURIC ACID AND SODIUM HYDROXIDE FOR THE DETERMINATION OF KJELDAHL NITROGEN IN SOIL AND PLANT MATERIALS

FAQIR HUSSAIN, KAUSER A. MALIK, FAROOQ-E-AZAM AND ANWAR-UL-HAQ

Soil Biology Division, Nuclear Institute for Agriculture and Biology, Faisalabad, Pakistan

(Received May 25, 1989; revised April 21, 1990)

A study was conducted in the year 1988 to explore the possibility of using commercial grade H_2SO_4 and NaOH in place of reagent grades of these chemicals for the determination of Kjeldahl N in soil and plant materials. Nine soils and nine plant materials having different N content were analysed using commercial grade H_2SO_4 and NaOH from different sources. The commercial grade chemicals were found to be suitable for their respective functions in the Kjeldahl method as they yielded essentially the same N values. The cost of N analysis of soil and plant materials can be reduced appreciably by using commercial grade H_2SO_4 and NaOH.

Key words: Kjeldahl nitrogen, Commercial grade chemicals.