



ISSN 0030-9885

Coden: PSIRAA 37 (8) 291-348 (1994)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 37, No. 8, August 1994

Physical Sciences. Pages 291-318

Biological Sciences. Pages 319-341

Technology. Pages 342-348

Published monthly by

Scientific Information Centre

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pak. j. sci. ind. res., vol. 37, no. 8, August 1994

PETROGRAPHIC AND CHEMICAL CHARACTERISTICS OF GLAUCONITIC AND PHOSPHATIC SEDIMENTS OF THE KUSSAK FORMATION, KHEWRA GORGE, SALT RANGE, PAKISTAN**

S.R.H. BAQRI*, VIQAR HUSAIN, RUBINA BILQUEES, NAZIR JAN AND NISAR AHMAD
PCSIR Laboratories, Jamrud Road, Peshawar 25120, Pakistan

(Received February 20, 1992; revised February 7, 1994)

The Kussak formation is a sequence of glauconitic sandstone, shales and dolomite. Quartz, feldspar, dolomite, glauconite, apatite, illite, calcite, goethite, chlorite and montmorillonite were identified by XRD and microscopy. Quartz, feldspar and dolomite are predominant. Glauconite occurs as medium to coarse rounded pellets. Goethite occurs mostly as stain around grains. Apatite occurs as small pellets or as matrix. The green and rounded nature of the glauconitic pellets with approx. 6% K_2O and high percentage of major elements like Si, Al and Fe in most of the samples from Khewra Gorge suggest marine authigenic origin for the glauconite. Field and laboratory data suggest that glauconitic sandstones were deposited in deep and semiconfined conditions followed at the top by shallow sea conditions. The phosphatization may succeed glauconitization in a normal evolution of an epicontinental basin but low concentration of P_2O_5 in the Kussak sediments was perhaps due to lack of organic compounds.

Key words: Glauconitic and phosphatic sediments, Kussak formation, Khewra Gorge salt range.

Pak. j. sci. ind. res., vol. 37, no.8, August 1994

DROP SIZE AND DROP SIZE DISTRIBUTION IN A LIQUID-LIQUID EXTRACTION SPRAY COLUMN

MUHAMMAD TARIQ SAEED, M. JAMIL AND E.S. PEREZ DE ORTIZ*

PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Rumi, Lahore-54600, Pakistan

(Received July 2, 1991; revised March 3, 1994)

A photographic method was used for the estimation of drop size and drop size distribution obtained from multiple nozzles for a chemical system (zinc/di(2-ethylhexyl) phosphoric acid) for solute transfer from continuous to dispersed and dispersed to continuous phase. The experiments were performed in a glass spray column under semi-batch operation. Experimentally obtained drop sizes were compared with those predicted from drop size correlations for jetting and non-jetting conditions and the ones predicting best results are given for design purposes.

Key words: Drop formation, Mass transfer, Photographic method, Metal extraction.

Pak. j. sci. ind. res., vol. 37, no. 8, August 1994

DROP SIZE AND DISPERSED PHASE HOLDUP IN A SPRAY COLUMN

MUHAMMAD TARIQ SAEED AND MUHAMMAD JAMIL

PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Roomi, Lahore-54600, Pakistan

(Received February 25, 1992; revised March 5, 1994)

Drop size and dispersed phase holdup in a spray column for a reactive extraction system (zinc/di (2-ethylhexyl) phosphoric acid) has been obtained under solute transfer from continuous to dispersed and dispersed to continuous phase. A photographic method is used for the estimation of drop size and dispersed phase holdup. The experiments are carried out in a glass spray column operated under semi-batch mode, i.e. the continuous aqueous phase is kept stagnant and the dispersed phase is not recirculated. Dispersed phase velocity through the nozzles is varied from 3.4×10^{-2} to 24.5×10^{-2} m/s. Nozzle diameter ranges from 0.8×10^{-3} to 3×10^{-3} m.

Key words: Drop size, Dispersed phase, Holdup.

Pak. j. sci. ind. res., vol. 37, no.8, August 1994

SYNTHESIS OF NITROGEN-OXYGEN HETEROCYCLES FROM CARBOHYDRATE PRECURSOR

Synthesis and Spectra of 2-(5'-Aryl-1', 3',4'-Oxadiazol-2'-yl)-1, 6, 6-Trimethyl-4-Oxo-4, 5, 6, 7-Tetrahydroindoles

M. ABDEL RAHMAN, M. EL SADEK, S. ABDEL BAKY AND N. EL SOCCARY

Chemistry Department, Faculty of Science, Alexandria University, Alexandria, Egypt

(Received October 5, 1992; revised March 8, 1994)

6, 6-Dimethyl-4-oxo-4, 5, 6, 7-tetrahydroindol-2-carboxaldehyde (2) condensed with benzoylhydrazine to afford the corresponding benzoylhydrazone derivative '3'. Oxidative cyclization of 3 gave the corresponding 1, 3, 4-oxadiazole-mercuric complex '4'. On the other hand, the methylated aldehyde '5' condensed with a number of aryl and acylhydrazines to afford the corresponding hydrazones '6-18'. Oxidative cyclization of the acylhydrazones gave the corresponding 1, 3, 4-oxadiazoles '19-27'. The structures were confirmed by IR, ¹H-NMR and mass spectra.

Key words: Tetrahydroindole, Benzoylhydrazone, Oxadiazole.

Pak. j. sci. ind. res., vol. 37, no. 8, August 1994

CONDUCTIVITIES OF BROMAMINE-T IN WATER AND METHANOL AT VARIOUS TEMPERATURES

J. ISHWARA BHAT AND P. BINDU

*Department of Post-Graduate Studies and Research in Chemistry, Mangalore University,
Mangalagangothri - 574199, Karnataka, India*

(Received March 30, 1993; revised January 25, 1994)

The ionic conductivity of bromamine-T (BAT) in water and methanol as solvent has been studied as a function of temperature. The conductance data have been analysed by the Debye-Huckel, Fuosskraus, Shedlovsky and Fuoss Accascina Equations. The energy of activation of the rate process, thermodynamic parameters, molar conductivity at infinite dilution (λ_m°), Walden constant, dissociation and association constants (K's) have been calculated. A comparison of the λ_m° and K's values calculated from various equations has been made. An attempt is also made to propose the BAT as a weak electrolyte under the studied experimental conditions.

Key words: Conductivity, Bromamine-T, Temperature.

Biological Sciences Section

Pak. j. sci. ind. res., vol. 37 no. 8, August 1994

EVALUATION OF TOLTRAZURIL AS AN ANTIMICROSPORIDIAL DRUG

MD. AZIZUL HAQUE* ELIZABETH U. CANNING AND WAFAA S. HOLLISTER

Department of Biology, Imperial College of Science, Technology and Medicine, London, United Kingdom

(Received July 3, 1993; revised March 5, 1994)

The anticoccidial drug 'toltrazuril' was tested on the microsporidium *Nosema bombycis* in *Helicoverpa zea*, both by exposing larvae to drug after they had been infected with the microsporidia and by exposing uninfected larvae to the drug and microsporidian spores simultaneously. The drug at concentrations of 100, 200 and 400 µg/larva had no effect on the level of infection, estimated by the number of spores harvested from the larvae on day 8 post drug treatment. Midgut tissues from infected larvae, which had consumed 400 µg of toltrazuril, still had massive infections of the parasite, and no cytological alterations of the parasite were observed when infected tissues were examined by light and electron microscopy. The pH of the gut of *H. zea* is alkaline and should not have affected the solubility of the drug nor its absorption into the midgut cells. It is concluded that toltrazuril, even at a dose of 400 µg per larva, has no effect on *N. bombycis* in *H. zea*.

Key words. *Nosema bombycis*, *Helicoverpa zea* larvae, Toltrazuril inactivity.

DESCRIPTION OF A NEW SPECIES OF TABANIDAE (DIPTERA) FROM PAKISTAN

LIAQAT ALI ABRO

Pakistan Museum of Natural History, Islamabad, Pakistan

(Received August 11, 1993 ; revised March 3, 1994)

A new species *Tabanus bashiri* sp. n. is described and illustrated, based on the specimens collected from Chilas, District Diamer, Northern areas of Pakistan.

Key words: Tabanidae, New species, Pakistan

MICRO-NUTRIENT FORMULATIONS FOR AGRICULTURE

Part-II. Copper, Zinc, Manganese and Chromium Preparation

MIRZA ARSHAD ALI BEG, M. HANIF QURESHI, M. YUSAF, S.U. CHEEMA, IZHAR-UL-HAQ KHAN,
NAZIR A. CHOHAN AND NAWAB BEG

PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received July 16, 1989; revised March 10, 1994)

Micro-nutrient formulations for agriculture purposes have been produced mounting copper, zinc, manganese and chromium on five different fritted compositions. Release of elements was monitored by extracting the metals with ammonium citrate solution and estimating them by means of an atomic absorption spectrophotometer. The results show that release of copper can be controlled at a level of 1.4 to 4 ppm, that of zinc at 1.7 to 5.2 ppm, manganese at 1.8 to 8.6 ppm, while that of chromium at 0.02 to 0.3 ppm, by leachings, spread over a period of one hour to 10 days.

Key words: Micro-nutrients, Agriculture, Slow release nutrients.

UTILIZATION OF SOME ALGAE IN THE POULTRY FEED

PHOOL B. ZAHID

Department of Botany, University of Karachi, Karachi - 75270, Pakistan

(Received November 3, 1991; revised March 26, 1994)

Mass culture of algae were prepared to feed poultry birds. Three species were selected as test algae which include one species of coccoid green algae (*Chlorella vulgaris*), one from filamentous green algae (*Spirogyra ellipsospora*) and a thalloid marine green algae (*Ulva lactuca*). Attempts were made to achieve a low cost feed with high nutritional potential. It was observed that the birds (chick broiler) feeding on coccoid and thalloid green algae showed best results in terms of yield and quality of meat.

Key words: Algae, Feed, Poultry.

PREVALENCE OF COCCIDIOSIS IN BROILERS ON TWO FARMS IN BANGLADESH

MD. JAHURUL KARIM, NURJAHAN BEGUM AND MD. SHAHIDUR RAHMAN KHAN

Department of Parasitology, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

(Received October 2, 1993; Revised April 25, 1994)

Litter oocyst counts and lesion scoring of naturally infected chicken were carried out to study the prevalence of coccidiosis in broilers on two farms in Bangladesh. Except in one crop, the pattern of weekly litter oocyst counts and the rate of infection were very similar on both the farms. Oocysts were normally detectable in litter early at two weeks with gradual increase to reach a peak at five weeks ($9-22 \times 10^3$ per gramme of litter) and then declined. Although the rate of infection was higher at six weeks, in most cases the severity of lesions was almost equal both at 4 and 6 weeks, and mostly *E. acervulina* and *E. tenella* were responsible for these lesions. Five pathogenic species of *Eimeria* were detected in this study. *Eimeria acervulina* was the commonest and found in upto 80% birds examined at 6 weeks. With *E. tenella*, *E. maxima*, *E. brunetti* and *E. necatrix*, these rates were 70, 40, 30 and 20% respectively. *E. tenella*, *E. maxima* and *E. brunetti* occurs on and from 2 weeks whereas *E. acervulina* and *E. necatrix* never before 4 weeks. Coccidiosis was more prevalent during cold months of the year.

Key words: Coccidiosis, *Eimeria*, Lesion score, Litter oocysts.

Technology Section

Pak. j. sci. ind. res., vol. 37, no. 8, August 1994

A COMPARATIVE STUDY OF CONVENTIONAL AND A MODIFIED CARD WITH AN EXTRA ROLLER UNDER TAKER - IN

SHAHID SALEEM SHAD, SHEIKH MUHAMMAD NAWAZ AND ABDUL GHIAFFAR*

Department of Fibre Technology, University of Agriculture, Faisalabad, Pakistan

(Received September 1, 1991 ; revised March 19, 1994)

In this study, cotton sliver characteristics were compared among different speeds of extra roller fixed under taker-in and a high speed conventional card. Modified card with extra roller running at 150 rpm in clockwise motion produced dominating results over all other settings in respect to card and drawing sliver characteristics. Moreover, maximum waste extraction with minimum card web neps were also achieved at this speed.

Key words: Cotton, Card, Sliver performance.

THE CHEMICAL COMPOSITION AND FUNCTIONAL PROPERTIES OF JACK BEAN FLOUR (*CANAVALIA ENSIFORMIS*)

TAYO N. FAGBEMI, ALADESANMI A. OSHODI* AND BABATUNDE J. ARISE

Department of Food Technology, Federal Polytechnic, Ado-Ekiti, Nigeria

(Received June 6, 1993 ; revised March 26, 1994)

Jack bean (*Canavalia ensiformis*) was processed into flour and evaluated for its proximate and mineral composition. Some functional properties of the flour were also determined. The results showed that the flour contained 30.1% protein, 8.5% moisture, 3.6% fat, 3.8% ash, 2.7% crude fibre and 51.3% carbohydrates by difference. The mineral composition of the flour in mg/kg is: Ca (2160), Mg (1800), K (8600), Na (1700), P (3541), Mn (15), Cu (12), Fe (70) and Zn (26). The functional properties of the flour showed that it has least gelation concentration of 10% (w/v), emulsion capacity of 20%, oil absorption capacity of 105.6%, water absorption capacity of 160% and foaming stability of 4.9% after 2 hrs. The foaming capacity of the flour increases with increasing flour concentration while its protein showed a minimum solubility at pH₄.

Key words: Chemical composition, Functional properties, Jack bean flour.