

Coden: PSIRAA 29(5) 315-400 (1986)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 29, No. 5, October 1986

Physical Sciences. Pages 315-351
Biological Sciences. Pages 352-375
Technology. Pages 376-400



Published bimonthly by

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 29, No. 5, October 1986

CHARGE TRANSFER COMPLEXES OF PHOSPHINE-NITROARYLS

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(Received December 11, 1985)

Compounds of tertiary phosphines with nitroaryls like 1, 3, 5-trinitrobenzene, 2, 4-dinitrophenol and 2, 4, 6-trinitrophenol (picric acid) have been reported. Picrates of tertiary alkyl phosphines have been obtained in good yields from stoichiometric amounts of picric acid and tertiary phosphines, viz, trimethyl, phenyldimethyl, triphenyl and tri-*p*-tolylphosphines. Tertiary alkylphosphines react instantaneously with the three nitroaryls at room temperature with the deposition of intensely coloured compounds. Tertiary arylphosphines react only with picric acid and their reaction is very slow; it needs long refluxing when dark crystalline solids are obtained.

Spectroscopic studies of phosphine nitroaryls suggest that they are charge transfer complexes. A band characteristic of charge transfer is found in the uv spectra of all complexes. This band shows a linear relationship with the ionization potential of tertiary phosphines. Charge transfer complex formation is further supported by ir study in which the ν_{as} (N-O) is shifted to higher frequency with the appearance of two bands and a red shift in γ (C-H) of the nitroaryl moiety on complexing with phosphines.

MASS TRANSFER STUDIES IN A RECTANGULAR DUCT

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(Received December 11, 1982)

Experimental measurements have been made of mass transfer in a rectangular duct of variable aspect ratio. It has been found that the mass transfer coefficient has a maximum value at the vicinity of the inlet and is correlated by: $Sh = 0.20 (Re)^{0.62} (Sc)^{1/3}$. The mass transfer data in the fully developed concentration region have been correlated by: $Sh = 0.014 (Re)^{0.86} (Sc)^{1/3}$. The results are compared with those found in the literature.

INDIRECT DETERMINATION OF NITRATE BY ATOMIC ABSORPTION SPECTROPHOTOMETRY

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(Received September 12, 1985; revised December 23, 1985)

A new indirect atomic absorption spectrophotometric method for the determination of nitrate is described. The method is based on the reduction of nitrate with mercury-sulphuric acid mixture. Absorbance of released mercurous ions was measured in an air-acetylene flame.

Key words. Indirect determination of nitrate; indirect atomic absorption spectrophotometry; nitrate determination by AAS.

A SUPER-SULPHATED FORMULATION FOR AMELIORATION OF ALKALINE/SALINE SOILS

M. Arshad Ali Beg, S. Naeem Mahmood, Sitwat Naeem, M. S. Siddiqui and
A. Haleem Khan Yousufzai

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(Received July 10, 1985; revised April 15, 1986)

Salinity and also sodic alkalinity of the soil is corrected by the use of various soil amendments of which gypsum is considered to be very effective. It is applied to sodium affected soil, which has only a limited amount of pores to allow calcium ions to replace the adsorbed sodium. Soil particles

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ESTIMATION OF QUALITY CONTROL PARAMETERS AND TRACE METAL LEVELS IN VARIOUS PUBLIC UTILITY WATERS: PART I. — N.W.F.P.

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(Received December 24, 1984; revised May 10, 1986)

Water quality control parameters and trace metal levels for public utility waters belonging to a selected area in NWFP have been estimated and reported. Physicochemical parameters, measured include temperature, pH, conductance, alkalinity, hardness (CaCO_3), chemical oxygen demand (COD), dissolved oxygen (DO), phosphate, nitrate, nitrite and total dissolved solids (TDS). Trace elements estimated by the atomic absorption method are sodium, potassium, copper, iron, zinc, strontium, nickel, cobalt, lead, cadmium, chromium, barium and mercury. Duplicate runs were conducted at predetermined optimum operating conditions with an overall precision of $\pm 1.5\%$. Parallel measurements on concentrations of lead and cadmium were carried out using the APDC/MIBK method to warrant a quantitative comparison of the results obtained. The data are reported at $\pm 2S$ confidence level, and discussed in terms of the feasibility of the tested waters for human consumption.

Key words: Water Quality; Trace Metal Levels in Water; Water Quality, Parameter.

A COMPARATIVE STUDY OF SENNOSIDE CONTENT OF *CASSIA* SPECIES

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(Received July 24, 1985; revised April 28, 1986)

The sennoside content of the leaves and pods of *Cassia angustifolia*, *C. fistula* and *C. holosericea* has been estimated spectro-photometrically following ferric chloride oxidation and hydrolysis in acidic medium. *C. holosericea* has been studied for the first time for its sennoside content.

Short Communication

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AMINO ACIDS AND SUGARS CONSTITUENTS OF *CARISSA CARANDAS*

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(Received 27, October 1985; revised April 8, 1986)

Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 29, No. 5, October 1986

ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OILS OF THE UMBELLIFERAE FAMILY

Part III. *Pimpinella anisum*, *Pimpinella acuminata* and *Pimpinella stewartii*.

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(Received June 11, 1986)

The essential oils of *Pimpinella anisum*, *P. acuminata* and *P. stewartii* were tested against the standard cultures of *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Shigella dysentery*, and *Vibrio cholera*. The optical density measured spectrophotometrically at 530 nm in liquid media was taken as an index of the growth of bacteria. The oil of *P. anisum* showed good inhibitory activity against all the five pathogens. Whereas *P. stewartii* had a notable inhibitory effect against *Shigella dysentery* and *P. acuminata*, inhibited the growth of *S. aureus* only. The antimicrobial activity of different species of the Umbelliferae family does not seem to be genera related.

Key words: Antimicrobial Activity, Essential Oils, Minimum Inhibitory Concentration.

NITRATE AND NITRITE CONTENTS OF VARIOUS WHEAT VARIETIES GROWN IN THE PUNJAB

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(Received April 3, 1986)

Nitrate and nitrite contents of 12 varieties of wheat (140 samples) and 80 samples of wheat flour from various regions of the Punjab were determined. Variety Punjab-81 from Sahiwal region contained the maximum amount of nitrates (226.2 – 343.0 ppm) while the nitrite contents of Maxi Pak-65 from Lahore region were the highest i.e. 6.9 – 31.2 ppm. Wheat flour from Sheikhpura area contained the highest levels of nitrates (2.1 – 24.0 ppm). Daily dietary intake of nitrates and nitrites from wheat flour varied from 104.5 – 238.4 ppm and 0.7 – 12.0 ppm respectively.

LABORATORY STUDIES ON SOME PLANT EXTRACTS AS MOSQUITO LARVICIDES

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(Received October 25, 1985; revised May 7, 1986)

Preliminary screening work on the biological activity of crude extracts of 24 local plants has been undertaken to study their larvicidal effects and growth inhibition properties against the 4th instar larvae of *Aedes aegypti* L. Alcoholic extracts of 12 plants resulted in the mortality of larvae to varying degree at 1000, 500 and 100 ppm doses. The extracts of *Ervatamia coronaria* proved highly toxic, whereas the petroleum ether extracts of this plant showed no larvicidal activity. The alcoholic extracts of *Cassia holosericea* also produced no lethal effects on larvae. The larvae exposed to these extracts could not pupate at 1000 ppm dose. These two plants seem to have juvenomimetic activity. There is need for further work to study these extracts for active ingredients to confirm the juvenile hormone (JH) like compounds in them.

THE ANTIBACTERIAL PRINCIPLES OF *SPHAERANTHUS INDICUS* ISOLATION, PURIFICATION AND ANTI-BACTERIAL ACTION

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(Received September 4, 1985; revised May 12, 1986)

Crude alcoholic extract of flowers of *Sphaeranthus indicus* showed antibacterial activity against 18 different species of Gram-negative and Gram-positive bacteria used. Antibacterial activity was present in alkaloidal as well as in non-alkaloid fractions. Four new alkaloids have been isolated by chromatographic methods. Broad spectrum antibacterail activity was exhibited by two isolated alkaloids.

Key words: Anti Bacterial Principles; Anti Bacterial Action.

**EFFECT OF SOME TRACE ELEMENTS ON THE NUCLEIC ACIDS OF
GERMINATING WHEAT SEEDS**

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(Received March 30, 1986)

Short Communication

Pakistan J. Sci. Ind. Res., Vol. 29, No. 5, October 1986

**MACROBRACHIUM IDAE (HELLER), A NEW RECORD OF
FRESH WATER PRAWN FROM PAKISTAN**

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(Received February 5, 1986; revised May 15, 1986)

Technology Section

Pakistan J. Sci. Ind. Res., Vol. 29, No. 5, October 1986

PRODUCTION MECHANISM OF MANGANESE SULPHATE FROM INDIGENOUS ORE

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(Received November 24, 1985)

Experimental conditions have been established for the production of industrial and agricultural grade manganese sulphate monohydrate from an indigenous manganese ore. Pulverised ore of the particle size 250 mesh, upon reaction with sulphur dioxide for 90 minutes is converted into manganese sulphate. The manganese salt free from dithionate as well as iron impurities was obtained by diluting sulphur dioxide gas with air prior to its reaction with manganese ore. A mechanism for the reaction between manganese ore and sulphur dioxide gas has been suggested.

DETOXIFICATION OF COMMERCIALY PRODUCED COTTONSEED MEAL

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(Received September 29, 1985)

Free gossypol content of cottonseed meal was reduced to 0.045 % by keeping it in boiling water for 15 mins. Biological evaluation of the water treated meal indicated no adverse effects on its NPU and PER. These values were comparable with the chemically treated meals and better than the meal detoxified with solvents.

Key Words: Cotton seed cake; detoxification; biological evaluation.

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UTILIZATION OF COTTON SEED HULLS AS ANIMAL FEED*

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(Received February 10, 1985; revised April 2, 1986)

The dry matter digestibility of cotton seed hulls increased from 15.5% to 38.8% and 29.7% on treatment with 4.0% sodium hydroxide and 5.0% potassium hydroxide respectively. Digestibility of the hulls also improved on ammoniation. Reduction in lignin contents was observed by these treatments. A two to three fold increase in non-protein nitrogen was also observed after treatment with ammonia.

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PRODUCTION OF MARINE CHEMICALS IN PAKISTAN
Part II: Studies on Manufacture of Chemicals from Seawater Bittern

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(Received January 1, 1985)

Studies on the production of chemicals like magnesium sulphate, magnesium chloride and potassium chloride have been carried out and a simple process has been developed. The different steps of the process are all physical operations such as evaporation, chilling, crystallization, filtration, drying etc. excepting desulphatation. Based on the data collected from laboratory and small scale operations a plant of 1 ton/batch capacity has been designed, fabricated, and installed. Material balance related parameters have been established on the basis of the experiment on the said plant.

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ION EXCHANGE RESIN-CATALYSED ESTERIFICATION OF ALIPHATIC AND AROMATIC ACIDS WITH METHANOL AND ETHANOL

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(Received September 16, 1984; revised October 15, 1985)

Studies have been made on the kinetics of the esterification of methanol and ethanol with various types of organic acids using the *m*-cresol-formaldehyde ion exchange resin as a catalyst. The influence of molecular weight and structure of the acids on the conversion has been investigated. The experimental data was found to fit a second order bimolecular kinetic equation. The rate constant (K_1) for nine organic acids has been calculated. The velocity constant was found to bear linear relationship with the molecular weight of the acids under investigation.