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Physical Sciences Section

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SPECTRO PHOTOMETRIC DETERMINATION OF IRON (III) WITH 3, 3-DIMETHYL-1-(2-CARBOXYPHENYL) TRIAZENE

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(Received October 7, 1986; revised December 31, 1986)

A new spectrophotometric method for the estimation of iron (III) is described. Ferric ions form a stable, water soluble, intense violet complex ion with 3, 3-dimethyl-1-(2-carboxylphenyl) triazene (DCPT) at pH 2.8. The complex ion has a broad absorption band centred at 520 nm. The complex with maximum colour intensity is formed when the metal ion and the ligand are present in 1:2 ratio. The coloured solution obeys Beer's law in the 0-20 ppm concentration range. A number of metal ions, if present below certain concentrations, do not interfere the determination of iron (III).

Key words: Spectrophotometric, Determination, Iron (III).

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INHIBITION OF CORROSION OF COPPER IN NITRIC ACID

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(Received December 11, 1985; revised October 30, 1986)

It has been found that aniline, n-butylamine, sodium phosphate and sodium sulphate act as inhibitors in the corrosion of copper in 2.0 N HNO_3 . The effect of inhibitor concentration, immersion time and temperature on the corrosion of copper has been also studied. Polarization measurements have been carried out and the Tafel slopes evaluated. Activation energies have been calculated.

Key words: Corrosion inhibitor; Copper corrosion.

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REACTIONS OF TRIKETO COMPOUNDS. Part-I

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(Received October 15, 1985; revised January 13, 1987)

Condensation of ninhydrin with diphenyl ketone gives Indanocyclone (I), with urea it forms ninhydrilurea (II), whereas, acetamides react to give indeno [2, 1-b] pyrroles (III). It is now reported that ninhydrin reacts with dimethyl ketone to form cyclopent [a] indene dione (IV) in acidic media.

Key words: Cyclopent [a] indene-2, 8-dione; Ninhydrin acetone.

THE DIELECTRIC CONSTANT DEPENDENCE ON THE REACTION RATE OF MONOCHLOROACETATE WITH THIOSULPHATE IONS

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(Received February 2, 1985; revised January 6, 1987)

Studies on the reaction rate between sodium monochloroacetate and sodium thiosulphate at 25° and at various concentrations of the reacting ions and various dielectric constant ϵ with acetone-water mixtures showed that the specific rate constant (k) increased with the dielectric constant. A comparison of the experimental values of the radii of the transient species for single sphere and double sphere models ($r^\ddagger$ and r_{AB}) respectively (obtained from the linear plots of $\log k_0$ and $1/\epsilon$) with the theoretical values led to the conclusion that the transient species could best be described by the "SINGLE SPHERE" model for the reaction under consideration.

Electrostatic and non-electrostatic contributions to the changes in the free energy of activation ($\Delta G_{es}^\ddagger$ and $\Delta G_{n.e.s.}^\ddagger$) in the formation of transient species were also evaluated.

Key words: Dielectric constant; Reaction rate; Transient species.

PREPARATION OF 9, DESOXO-9, DEHYDRO METHYL PHEOPHORBIDE a.

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The reaction of 9, desoxo-9, hydroxy substituted methyl pheophorbide a with trifluoro acetyl imidazole and 1-8, bis-dimethyl amino naphthalene yielded 9, desoxo-9, dehydro methyl pheophorbide a.

Key words: Pheophorbide, Pheophorbide a; Pyropheophorbide.

POTENTIAL ANTIBACTERIAL AGENTS**Part I. Synthesis of Substituted 1-Arylaminomethyl Benzotriazoles**

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(Received August 25, 1986; revised December 30, 1986)

Condensation of 1,2,3-benzotriazole with primary aromatic amines, viz, 2-amino, 5-chlorobenzophenone; 4-(N-morpholino)-aniline; 4-(N-piperidino)-aniline and 3-acetyl aniline, under the conditions of Mannich reaction, afforded the hitherto unreported substituted 1-arylaminomethyl benzotriazoles which were assigned structures (I to IV) on the basis of their H-nmr and mass spectral data. Anti-bacterial activity determination showed compounds (I to IV) to inhibit the growth of *Salmonella typhi*, *Pseudomonas spp.* and *Escherichia coli*. Compounds I and II were also found active against *Bacillus subtilis*.

Key words: Mannich Reaction; 1-Arylaminomethylbenzotriazole; Antibacterial Activity.

MICRONUTRIENT STATUS OF SOILS IN THE THIKRIWALA PROJECT AREA OF FAISALABAD DISTRICT

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(Received February 2, 1986; revised July 20, 1986)

The micronutrient status of the soil of the Thikriwala area was determined for their better management. Soil samples from 82 sites were collected for physico-chemical characterization and the determination of Na_2EDTA extractable Cu, Zn, Fe, Mn and B. Twenty percent of the samples were deficient in Zn and none of them in Cu. Iron and Mn were also present in sufficient amounts. Four percent of the samples showed somewhat higher quantities while others had sufficient amount of boron. Soil pH indicated a negative correlation with Zn and Fe but Cu, Mn, and B were positively correlated with the amount of clay. The presence of CaCO_3 indicated a negative correlation with the available amounts of all the trace elements assessed in the study.

Key words: Micronutrients; Soil properties; Deficiencies.

LEAD RETENTION OF SOIL CLAY MINERALS AGAINST DILUTE HCl EXTRACTION

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(Received January 2, 1986; revised June 5, 1986)

Lead is an environmentally toxic heavy metal entering our food chain via soil-plant system. Retention of lead (Pb) against dilute HCl extraction by eleven different clay samples was studied in laboratory. One g each of different clay samples receiving 10 ml aliquot of 25 ppm Pb (NO₃)₂ were incubated at $30 \pm 2^{\circ}$, followed by alternate wetting and drying and extraction by 0.1 N HCl to assess the magnitude of retention.

The proportion of Pb retention by various clay systems ranged over 24 to 75 % with an average of 50 %. Various clay systems showed a very inconsistent behaviour in Pb retention to draw a general recommendation. However, mono-mineralic samples containing > 90 % montmorillonitic, beidellitic and vermiculitic types of dominating minerals retained 45, 48 and 57 % of applied Pb respectively. The maximum Pb retention of 75 % was found in a system composed of 50-90 % vermiculite and 5-20 % halloysite. The proportion of Pb retained significantly correlated at $P < 0.1$ ($r = 0.86$) with cation exchange capacities for various minerals and the relationship was expressed by a regression equation, $Y = 14.26 + 0.52 X$. The clay mineral composition, therefore, exhibited an important role with regard to Pb retention against HCl extraction. However, an elucidation of Pb accumulation by various food crops in relation to clay mineral composition is warranted.

Key words: Lead; Clays; Retention.

Biological Sciences Section

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ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OILS OF THE UMBELLIFERAE FAMILY

Part V. *Carum carvi*, *Petroselinum crispum* and *Dorema ammoniacum* Oils

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The antimicrobial activity of the essential oils of *Carum carvi*, *Petroselinum crispum* and *Dorema ammoniacum* has been studied spectrophotometrically in emulsified broth against the standard strains of *Staphylococcus aureus*, *E. coli*, *S. typhi*, *S. dysenteriae* and *V. cholera*. Optical density was taken as the index of bacterial growth. All oils showed good inhibitory activity against all five pathogens.

Key words: *Carum carvi*, *Petroselinum crispum*, *Dorema ammoniacum*.

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COMPARISON OF VARIOUS FRACTIONS OF MUSTARD AND RAPE SEEDS FOR THEIR AMENABILITY TO DETOXIFICATION

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(Received November 27, 1985; revised September 29, 1986)

Sixteen varieties of mustard and rapeseeds were subjected to air classification after crushing. The hull fraction to kernel fraction ratio in *Brassica juncea*, *Brassica campestris* and *Brassica napus* varieties ranged from 11:89 to 28.6: 71.4. Moisture and fibre contents were higher in the hull fraction whereas protein, oil and allyl isothiocyanate were mainly stored in the kernel fraction.

Key words: Mustard/rape seeds, glucosinolate, dehulling.

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BIOLOGICALLY ACTIVE PEPTIDES FROM *ASPERGILLUS FLAVIPES*

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(Received March 7, 1985; revised December 7, 1986)

Aspergillus flavipes was grown on Czapek sucrose nitrate medium for two weeks. The peptides from cell free broth (CFB) were separated on Sephadex G-25 column. Some of the peptides showed antimicrobial activities inhibiting the growth of fungi and bacteria. The amino acid composition, N-terminal amino acids and isoelectric points of these peptides are also reported.

Key words: Antimicrobial Activity, peptides, *Aspergillus*.

BIOCHEMICAL COMPOSITION AND CALORIFIC VALUES OF THE THREE EDIBLE SPECIES OF PORTUNID CRABS FROM KARACHI

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(Received August 24, 1986; revised December 23, 1986)

Claw and body meat of three species of portunid crabs (male and female), viz, *Portunus pelagicus* (Linnaeus), *Portunus sanguinolentus* (Herbst) and *Scylla serrata* (Forskal), were analysed for biochemical composition. Dry tissue contains 85-95% organic matter of which 55-65% is portein. Crab tissue is highly nutritious having C:N values between 3.34:1 and 4.29:1. Percent lipid, carbohydrate and ash contents are low.

Key words: Crab fisheries; Edible crab; Portunid crabs; Metabolic equivalents.

INFLUENCE OF SOIL AND CLIMATIC CONDITIONS ON THE COMPOSITION OF MUSTARD (*BRASSICA JUNCEA*) AND RAPE (*BRASSICA CAMPESTRIS* and *BRASSICA NAPUS*) SEEDS

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(Received July 25, 1985, revised November 13, 1986)

Twenty-eight varieties of *Brassica* seeds from Punjab, Sind and NWFP regions were examined for their proximate composition and toxic factor. The *Brassica* varieties from Sind region contained 36.0 to 49.5 % oil (Mus-13 and Mus-23), 23.9 to 32.9 % protein (Mus-80 and Mus-13), 0.22 to 1.41 % allyl-isothiocyanate (*Brassica napus* and *Raya-4*) and 4.1 to 10.4 % crude fibre (local *Raya* and *Brassica napus*), which were higher than the Punjab and NWFP varieties.

Key words: Mustard/rape seed, composition, environment.

BENTHIC FAUNA OF UNGWANA BAY, MOMBASSA (KENYA) – A PRELIMINARY ACCOUNT

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(Received September 8, 1986; revised January 5, 1987)

Benthic fauna of two localities in the Ungwana Bay, Mombassa, Kenya, was studied during August 1983. A total of 24 faunal groups was recorded from both localities. Polychaetes were the dominant group in macrofauna and nematodes in meiofauna. The meiofauna was numerically about 76 times of macrofauna. The food requirement of the benthic fauna was 3 times more at shallow station.

Key words: Benthicfauna; Composition; Kenyan Coast.

THE PERSISTENCE OF SOME ORGANOPHOSPHATE, CARBAMATE AND PYRETHROID INSECTICIDES ON ALFALFA (*MEDICAGO SATIVA*)

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(Received March 24, 1986; revised October 5, 1986)

The persistence of dichlorvos, carbaryl, pirimicarb and cypermethrin insecticides was studied on the alfalfa crop. Dichlorvos, carbaryl and cypermethrin, each at 0.2% and pirimicarb at 0.1% concentration were applied to the leaves of the crop. Samples for residue analysis were collected at 0, 1, 2, 4, 8, 10, 14 and 17 days post-treatment. The samples were extracted for residues and analysed on gas liquid chromatograph.

The degree of persistence, in terms of residual life, amongst the insecticides tested was on cypermethrin > carbaryl > pirimicarb > dichlorvos. Residues of carbaryl subsided well below the tolerance limit (100 ppm) one day after application while that of dichlorvos reached the tolerance limit (0.5 ppm) 2 days after application to the alfalfa crop.

Key words: Insecticides; Residues; *Medicago sativa*.

**A TYPICAL CASE OF BACTERIAL ORIGIN OF INSECT COLOURATION
(IN *CICADELLA VIRIDIS*)**

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(Received December 1, 1986)

In the present communication there is an excellent reproduction of a coloured insect and of the colours idoures of its two symboitic bacteria which produce the pigments of the wing and of the main body. A fact worthy of mention is that the bacteria isolated easily showed mutations.

Key words: Insect colours; Bacteria; *Cicadella viridis*.

STUDIES ON BIOLOGICAL NITROGEN FIXATION IN LUCERNE – WHEAT ASSOCIATION

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(Received November 28, 1985)

Preliminary studies on the availability of biological nitrogen fixed by lucerne to the associated wheat were conducted. The treatments studied were wheat alone (check), wheat fertilized at 56 kg P_2O_5 and 56 kg P_2O_5 + 112 kg N/ha, wheat-lucerne fertilized at 56 and 112 kg P_2O_5 /ha, and lucerne alone fertilized at 56 kg P_2O_5 /ha. It was observed that both chemical and biological nitrogen sources significantly affected the various yield parameters of wheat. In the lucerne – wheat association, wheat was suppressed when fertilized at 56 kg P_2O_5 /ha but improved when fertilized at 112 kg P_2O_5 /ha. Lucerne monoculture fixed a greater amount of biological nitrogen. In the lucerne – wheat association biological nitrogen was fixed but a part of that appeared to be utilized by the associated crop.

Key words: BNF; Lucerne; Wheat.

GROWTH, YIELD AND OIL CONTENT OF SPRING SUNFLOWER AS INFLUENCED BY NPK FERTILIZER APPLICATION

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(Received September 20, 1986; revised December 28, 1986)

A study to determine the effect of NPK application at 0-0-0, 75-0-0, 0-50-0, 0-0-50, 75-50-0, 75-0-50, 0-50-50 and 75-50-50 Kg NPK/ha, on the seed yield and oil content of spring sunflower was conducted on sandy clay loam soil having on an average 0.063 % N, 8.8 ppm available P_2O_5 and 224 ppm available K_2O during the year 1984. The whole of N, P_2O_5 and K_2O in the form of urea, SSP and SOP, respectively were applied at sowing in the respective treatments. The results revealed that the average seed yield increased from 18.84 quintals/ha without N to 26.45 quintals/ha with 75 Kg N/ha and a further increase to 27.77 quintals/ha with 50 Kg K_2O /ha along with N was not significant. On the other hand seed oil content was reduced by 5.63 percent with the application of 75 Kg N/ha alone while addition of P, K or PK each at the rate of 50 Kg/ha to 75 Kg N improved the seed oil content almost to the level of unfertilized one. However, increase in seed yield as a result of N application led to an increase in oil yield/ha. It was further observed that addition of P&K to N did not contribute considerably towards increasing 1000-seed weight over N alone, while K application in combination with N played significant role in increasing the number of seed per head. The plant height increased significantly in plots fertilized with N, NP, NK and NPK over plots treated with P, K, PK or no fertilizer.

Key words: *Helianthus annuus*, Agronomic characters, oil content, yield, Pakistan.

ATTRACTION OF MALE *EMMALOCERA DEPRESSELLA* MOTHS IN TRAPS BAITED WITH VIRGIN FEMALES

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(Received March 16, 1986; revised May 21, 1986)

Investigations were made on the time and duration of pheromone emission by the females of *Emmalocera depressella* (Swinh.) and attraction of male moths to female baited traps under field conditions. The females emitted sex pheromone soon after emergence and were most attractive during the first two nights. The activity of moths in the field was maximum between 9-11 p.m. The number of baited females was found to have a significant effect on the catches of male moths in the traps.

Key words: Sex pheromone, Sugarcane borer, *Emmalocera depressella*.

Short Communication

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AMINO ACID AND SUGAR CONSTITUENTS OF *BOMBAX MALABARICUM*

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Key words: Amino Acids, Sugars; *Bombax malbaricum*.

Short Communication

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FLAVONOIDS FROM VIOLET FLOWERS OF *SYRINGA VULGARIS*

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(Received January 9, 1986; revised September 23, 1986)

Two flavonoids were isolated from the fresh violet flowers of *Syringa vulgaris* and identification carried out through spectroscopy showed them to be rutin and kaempferol-3-O-rutinoside.

Key words: Rutin; Kaempferol-3-O-rutinoside, Droplet Counter Current chromatography

Technology Section

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THE INFLUENCE OF PLASMA PROCESSING ON INDIUM TIN OXIDE/INDIUM PHOSPHIDE SOLAR CELLS

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(Received June 11, 1986, revised December 7, 1986)

This paper reports on the influence of fabrication procedures on the performance of solar cells based on radio frequency sputter deposited films of n-type indium tin oxide on single crystal substrates of p-type indium phosphide. In particular, the effect of exposing the substrate to a very low power plasma prior to deposition of the film is considered. It is shown that devices with an Air Mass 1.5 efficiency of approximately 16%, total area, (equivalent to 18.7% active area) can be produced when the low power plasma exposure time has been optimized. Depth profiling has shown that these devices are almost certainly very shallow buried homojunctions, the depth of which depends essentially on the substrate doping density. The capacitance/voltage profiles and absolute quantum efficiencies are also influenced by the low power plasma exposure time; its effect apparently being to change the distribution of impurities near the surface of the InP.

Key words: Indium phosphide; RF-Sputtering; Buried homojunction.

THERMAL COPOLYMERIZATION OF ACRYLONITRILE AND STYRENE IN THE PRESENCE OF SOME COMPLEXING AGENTS

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The thermal copolymerization of styrene and acrylonitrile in the presence of complexing agents like CuCl_2 , CoCl_2 , HgCl_2 , ZnCl_2 , PtCl_6 and CrCl_3 has been investigated and the increasing and decreasing effects of the complexing agents on the rate have been observed. The complexation between inorganic salts and the monomer takes place through the nitrile group in acrylonitrile. The inorganic salts act as chain transfer agents and do not appreciably change the reactivity ratios of the monomers.

Key words: Complexing agent, Delocalisation of electrons, Chaintransfer agents.