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Physical Sciences Section

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APPLICATIONS OF PULSE RADIOLYSIS AS A FAST REACTION TECHNIQUE

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Applications of pulse radiolysis, a technique in radiation chemistry used for the determination of kinetics of very fast reactions and for the characterization of short lived transients has been described. Since it is a relatively new technique, some information on the pulse radiolysis set up, such as pulse radiation sources and different detection techniques have been given. Detection and characterization of primary radicals in irradiated solution by pulse radiolysis as well as its importance to solve a variety of problems in chemical and biological sciences have been briefly reviewed.

Key words : Pulse radiolysis, Radiation chemistry, Fast reaction technique.

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SYNTHESIS OF SOME NOVEL TETRAZOLE DERIVATIVES AS POTENTIAL ANTIMICROBIAL AGENTS

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(Received February 27, 1990; revised October 17, 1990)

5-(*p*-or *m*-Acetylphenoxy)-1-phenyl-1H-tetrazole (I & II) were prepared and treated with *p*-bromo-or *p*-nitrobenzaldehyde in alkaline medium to afford the α , β -unsaturated ketones (III & IV). 3-Cyanopyridone (V & VI) and 2-amino-3-cyanopyridine (VII & VIII) were obtained by cyclocondensation of (III & IV) with ethyl cyanoacetate and malononitrile, respectively. The semicarbazones (IX & X) obtained by reaction of (I & II) with semicarbazide-HCl, were reacted with selenium oxide and thionyl chloride to give the corresponding 1,2,3-selena (XI & XII) and 1,2,3-thiadiazole derivatives (XIII & XIV), respectively. The prepared compounds were tested for their antimicrobial activity.

Key words: 1-Phenyl-1H-tetrazoles, Antimicrobial activity.

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DENSIMETRIC CHARACTERIZATION OF THE ASPHALTENE, OIL AND RESIN COMPONENTS OF THE SOUTH-WESTERN NIGERIAN BITUMEN

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The asphaltene, oil and resin components of the South-Western Nigerian bitumen, prepared by solvent extraction technique, followed by elution-adsorption chromatography, were characterized using the densimetric method. The following proportions were obtained for the three components: asphaltene 25.27 ± 0.08 , oil 36.30 ± 0.01 , and resins $38.43 \pm 0.02\%$. Results of the densimetric analysis indicated that the components have different average chemical structures, but similar chemical composition. All were found to be mixed paraffinic, naphthenic, aromatic, and hetero-atomic - containing compounds, with the rings in the molecule being polycyclic. Some properties of the bitumen were determined, and results given.

Key words: Nigerian bitumen, Components, Densimet

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CONTRIBUTION TO EQUILIBRIUM CONSTANT DUE TO CHANGE IN NET CHARGE ON METHEMOGLOBIN IN ITS REACTION WITH AZIDE ION IN WATER AND ETHYLENE GLYCOL MIXTURES

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(Received June 24, 1989; revised October 22, 1990)

The calculation of the contribution due to electrostatic interaction to the equilibrium constant for the reaction of methemoglobin with azide ion in water and ethylene glycol mixtures were carried out. The results show that upto 0.327 mole fraction of ethylene glycol, the contribution due to change in electrostatic interaction is not significant but beyond this mole fraction, it cannot be ignored. Despite this, it is observed that differences in the affinity of methemoglobin for the azide ion in aqueous solutions and in water/ethylene glycol mixtures, cannot be entirely due to differences in electrostatic interactions in two media.

Key words: Equilibrium constant, Methemoglobin-azide, Water/Ethylene glycol.

ISOLATION AND STRUCTURE DETERMINATION OF 1,1,6,6-TETRACHLORO, 3,4-DIPHENYL HEXANE FROM BROWN ALGA *DICTYOTA DICHOTOMA*

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(Received March 17, 1990; revised November 21, 1990)

1,1,6,6-Tetrachloro, 3,4-diphenyl hexane **1** has been isolated from chloroform extract of brown alga *Dictyota dichotoma*. The structure of compound **1** has been elucidated on the basis of ^1H , ^{13}C -NMR and heterocorrelation (2D-NMR) experiments and confirmed by X-ray crystallography.

Key words: 1,1,6,6-Tetrachloro, 3,4-Diphenyl hexane, Isolation, Structure determination, Brown alga.

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POLLUTION DUE TO TANNERY EFFLUENTS IN THE KORANGI INDUSTRIAL AREA KARACHI

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(Received December 28, 1988; revised September 29, 1990)

Impact of indiscriminate discharge of tannery effluents on the ground water of the concerned Korangi Industrial Area has been studied. The analytical data on the effluents revealed elevated concentrations (ppm) of sodium (4650-9500), potassium (75-375), calcium (385-1082), magnesium (120-389), chromium (2.8-11.9), sulphate (1300-4286), bi-carbonate (329-2135) and chloride (8,778- 15,632). Wells located in the tannery area contain high dissolved solids exceeding 5000 ppm and chromium ion ranging between 0.048 and 0.39 ppm whereas wells located outside a radius of about 5 miles around the tannery sector contain low dissolved solids ranging between 976 and 1636 ppm and chromium less than 0.001 ppm. It has therefore been inferred from the data that the uncontrolled discharge of heavily polluted tannery effluents has contaminated underground water, caused adverse effect on the immediate environment and if permitted without appropriate control, could result in irreparable damage to the environment of the industrial and the coastal area.

Key words: Pollution, Tannery effluents, Analytical data.

Short Communication

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**Characteristics and Fatty Acid Composition
of *Jatropha Curcas* Seed Oil**

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Short Communication

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**Nitrogen-14 and Oxygen-17 Chemical Shifts
Studies of Quinoline 8-Hydroxyquinoline and
2-Methyl 8-Hydroxyquinoline**

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Biological Sciences Section

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PRELIMINARY STUDIES ON FREE LIVING NEMATODES FROM INDUS DELTA

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(Received October 23, 1989; revised October 15, 1990)

Wilsonema promissum n. sp. collected from soil sample with *Cephalobus persignis* and *Acrobeloides enoploides*. *W. promissum* n. sp. is described and illustrated. *Wilsonema promissum* n. sp. comes close to *W. cheliferum* Andrassy [1] in general shape of the body, but differs into the number of cervical annulations, length and 'c' ratio. *W. promissum* is also different from *Wilsonema agasatum* Nesterov [20], in body length, shape and arrangement of caudal glands. *Monochoides andrassyi* Timm [2], has been removed from *Galauxinema* Allgen [3] and again placed into the genus *monochoides* as *M. andrassyi* new combination. *Cephalobus persignis* Bastian [4], and *Acrobeloides enoploides* Loff [21], are reported for the first time from Pakistan.

Key words: Nematodes, Indus Delta, *Wilsonema promissum* n.sp.

SOME OBSERVATIONS OF PAKISTAN POPULATIONS OF ROOT-KNOT NEMATODES (*MELOIDOGYNE* spp.)

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(Received November 28, 1989; revised November 3, 1990)

Twenty populations of root-knot nematodes were collected and identified from different wild and cultivated plant hosts. These were *M. incognita* race-I -7, *M. arenaria* race-II, -4 and *M. javanica* -4. Two plants harboured mixed populations of *M. incognita* race - I and *M. arenaria* race - II and two plants had mixed population of *M. javanica* and *M. arenaria*. It was noted that intensity of infection was higher in cultivated plants as compared to wild ones.

Key words : Root-knot, *Meloidogyne* spp.

STRUCTURAL AND LIGAND BINDING PROPERTIES OF MONOMERIC AND DIMERIC FORMS OF CHICKEN AND BEEF CYTOCHROME C OXIDASE

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(Received October 16, 1989; revised October 29, 1990)

Beef heart cytochrome *c* oxidase is dimeric when reconstituted into membranes and in non-ionic detergent (Tween 80) at physiological pH [12,21] raising the possibility that this aggregation state is a prerequisite for enzymatic activity. In this paper two procedures for dissociating chicken and beef cytochrome *c* oxidase into monomers are presented and the electron transfer activity of the monomers are compared with those of the dimers under identical assay conditions. Spectroscopic and ligand binding properties of the monomeric form of cytochrome *c* oxidase from chicken and beef heart tissue are described and compared with those of the enzyme dimer. The absorption spectra of alkaline oxidase (pH 9.5 to pH 11) showed the reduced enzyme to have absorption maxima at 441 nm at 604. Maxima for the carbon monoxy complexes were 420 nm for alkaline incubated oxidase and 430 nm for oxidase at physiological pH and at 428 nm for purified monomers. Carbon monoxide titration showed that alkaline incubated oxidase (at or above pH 10.5) reacted with approximately twice the amount of carbon monoxide compared to oxidase at physiological pH of equal haem *a* content. However, titration of the purified monomers showed the reaction of carbon monoxide with only one of the two haem *a* groups of the oxidase similar to that of the dimeric enzyme.

Key words: Structural ligand oxidases, Chicken, Beef.

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GENOTYPE X ENVIRONMENT INTERACTIONS IN FORAGE SORGHUM VARIETY TESTS AND IMPLICATIONS ON SORGHUM BREEDING

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(Received July 7, 1990 ; revised October 22, 1990)

Eight sorghum genotypes were evaluated for their forage yielding ability at two locations for three years. Estimates of relative magnitudes of various types of genotype x environment interaction were obtained from forage sorghum performance tests. Genotype x location and genotype x year interactions were significant, but their components were relatively small compared with second order interaction and the genetic variance. Large significant second order interaction indicated that there was an important differential response of sorghum genotypes to specific environmental conditions which was not accounted for by either year or location groupings.

The use of additional years, locations and replications was most effective in reducing genetic variance of genotype mean. Considering time and cost, the most economical and advantageous testing scheme seems to be 4 replications, 2 years, and 2 locations.

Key words: *Sorghum bicolor* L., Genotypes, Environment.

LOCATIONAL DIFFERENCES IN FORAGE YIELD AND QUALITY OF MAIZE CULTIVARS

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(Received May 21, 1990; revised October 17, 1990)

The present study was conducted to find out how the forage yield and quality of maize are affected by different environments. The three agro-ecological zones viz. ARI, Sariab Quetta, NARC, Islamabad, and FRI, Sargodha were selected based on different physiography, geology, climate, and water availability (Appendix 1). Green fodder yields varied from 41.45 to 48.46 tonnes/ha, dry matter yields from 8.57 to 10.93 tonnes/ha, crude protein contents from 7.60 to 8.74 % and crude fibre contents from 30.88 to 32.45 % at the three diverse locations viz. Agricultural Research Institute, Sariab (Quetta), National Agricultural Research Centre, Islamabad, and Fodder Research Institute, Sargodha. The maximum, and similar, green fodder yields were obtained at Agricultural Research Institute, Sariab (Quetta) and National Agricultural Research Centre, Islamabad. The maximum and identical, dry matter yields were observed at National Agricultural Research Centre, Islamabad and Fodder Research Institute, Sargodha. The highest crude protein and crude fibre contents were recorded at Fodder Research Institute, Sargodha. It was interesting to observe that the same genotypes responded differently in the diverse environments for green fodder yield, dry matter yield, crude protein, and crude fibre contents. It was concluded that these variations for fodder yield and quality traits at various locations were due to different soil types, soil fertility, and climatic conditions.

Key words: Maize (*Zea mays* L.), Location, Forage quality.

Short Communication

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**Effect of Certain Fern Extracts on Growth and
Spore Germination of Fungi**

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Technology Section

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CATALYTIC - LIQUID PHASE OXIDATION OF TOLUENE

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(Received May 30, 1989; revised March 28, 1990)

Toluene, *p*-chloro, *o*-chloro toluene and *p*-xylene on air oxidation in presence of cobalt naphthenate as catalyst gives excellent result at low temperature. Benzoic acid, *p*- chloro benzoic acid, *o*-chloro benzoic acid and terephthalic acid were obtained in very good yield.

Key words: Oxidation, Cobalt naphthenate, Phenol.

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ELECTROLESS PLATING OF COPPER ON ABS PLASTIC

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(Received June 23, 1990; revised November 1, 1990)

Investigations were carried out for electroless deposition of copper on ABS plastic at room temperature. A suitable bath, consisting of copper sulphate, sodium potassium tartrate, formaldehyde and sodium hydroxide has been used. Within five minutes of immersion, the film of copper can be deposited. It gives reasonably thick and adherent coating of copper. The bath composition is simple. The method can be applied on commercial scale for electroless deposition of copper on various parts of machines made of ABS plastic.

Key words: Electroless plating, Copper, ABS Plastic.