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Physical Sciences Section

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SYNTHESIS OF SOME POTENTIALLY ANTICANCER SCHIFF-BASES FROM FURO-COUMARINS AND CHROMONES

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(Received November 13, 1985; revised April 3, 1986)

Treatment of 5-amino derivatives of 9-methoxypsoralene, 9-ethoxypsoralene and norvisnagin with aromatic aldehydes, viz. benzaldehyde, 2-chlorobenzaldehyde, 4-N, N-dimethylaminobenzaldehyde and 4-nitrobenzaldehyde afforded the corresponding Schiff-bases (Ib-e, IIb-e and IIIb-e), respectively. Treatment of Ib, IIb and IIIb with mercaptoacetic acid, instead of cyclo-addition of thiol group to Schiff-bases to form thiazolidones gave starting amines Ia, IIa and IIIa, respectively.

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**PREPARATION AND CHARACTERIZATION OF PVC STABILIZERS:
BASED ON MIXTURE OF ZINC, CALCIUM AND BARIUM SALTS OF THE
CARBOXYLIC ACID**

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(Received January 24, 1985; revised April 8, 1986)

Different types of PVC stabilizers based on different divalent metals salts of the long chain fatty acids from various oils. Sunflowers oil based composition having Zn/Ca in the ratio of 1:1 and 1:1.5 showed good results. The other oils coconut oil, soyabean oil and linseed oil did not show encouraging results. The ratio between zinc and barium should not exceed 1:2 in case of soyabean oil. All the results were compared with imported stabilizer (ICI).

COMPARATIVE STUDY OF PHOSPHINE GENERATING SUBSTANCES AVAILABLE IN PAKISTAN

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(Received, July 17, 1985, Revised, December, 30, 1985)

Phosphine generating formulations which are being used in Pakistan have been evaluated for their performance by analysis for aluminium phosphide content, presence of ammonium carbamate, urea, sodium chloride, petroleum ether soluble substances, the rate of evolution of hydrogen phosphide as a function of time when left in the open, minimum time of phosphine release after exposure and fire hazard on adding one ml water per tablet.

The formulation can be categorised into (1) those containing ammonium carbamate and (2) those containing urea and sodium chloride. The presence of carbamate is effective in protecting the tablets from spontaneous ignition on adding water. On the other hand the reaction with water is violent in the case of sodium chloride and urea containing tablets since after 21-25 minutes the phosphine evolved catches fire.

THERMAL DEGRADATION OF CHEMICALLY CROSSLINKED POLY (VINYL CHLORIDE)

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(Received February 18, 1985; revised February 13, 1986)

Studies have been made of thermal degradation of chemically crosslinked poly (vinyl chloride) at 202°. It has been found that the rate of dehydrochlorination of chemically crosslinked poly (vinyl chloride) was inhibited while that of the previously gelled PVC was faster. A possible explanation has been given.

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MINERALOGY AND CHEMISTRY OF LIMESTONE RESOURCES OF KHYBER AGENCY, N.W.F.P.

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(Received July 10, 1985; revised January 12, 1986)

X-ray diffraction analyses, derivatography, and chemical analyses data for the limestone resources of the Khyber Agency are presented and discussed. The rocks of the area studied range from magnesia to dolomitic limestones and are composed of calcite, dolomite and subordinate amount of quartz and illite. Utilization of these limestone resources for cement, sugar and chemical industries has been suggested.

AN X-RAY CRYSTALLOGRAPHIC STUDY ON THE GEOMETRY OF THE
STRUCTURE OF NONAQUAEUROPIUM (III) TRIS
(TRIFLUOROMETHANESULPHONATE)

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Received, April 4, 1985; revised, October 27, 1985)

Crystals of the title compound are hexagonal, $a=b=13.722(5) \text{ \AA}$, $c=7.504(2) \text{ \AA}$, with two molecules per unit cell. Systematic absences are consistent with space group $P6_3/m$. The structure was solved by the heavy-atom method and was refined to a final residual index, $R=0.059$ for 3139 unique reflections. The molecule consists of a cation $[\text{Eu}(\text{H}_2\text{O})_9]^{3+}$ and an anion $[(\text{CF}_3\text{SO}_3)_3]^{3-}$ connected by hydrogen bonds. The metal atom is coplanar with three water oxygen atoms which are called the capping or equatorial oxygens. Another two sets each consisting of three oxygen atoms are lying in a plane symmetrically above and below the equatorial plane. A tricapped trigonal prism of nine water oxygen atoms surrounds the nine-coordinated Eu ion.

IMMOBILIZATION OF THE PROTEASE OF *CALOTROPIS PROCERA*

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(Received March 6, 1985; revised December 15, 1985)

Immobilization of the protease of *Calotropis procera* was carried out on amberlite (CG-50). The percentage of immobilization was found to be 23.5. A continuous immobilized enzyme proteolytic system was developed by packing a column with amberlite (CG-50, anion exchanger) using the citrate-phosphate buffer pH 7.0. The system was tested for its hydrolysing tendency by running through the matrix 1% casein solution in citrate-phosphate buffer pH 7.0 as substrate. The column was found to be significantly effective for continuous proteolysis. The life span of the enzyme immobilized on amberlite was about three weeks. A similar proteolytic system was also developed using charcoal as adsorbant matrix.

Short Communication

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**EFFECT OF WATER DEPRIVATION ON THE DISPOSITION
KINETICS OF SULPHADIMIDINE**

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Table 1. Mean plasma levels of total sulphadimidine in

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STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF N.O. UMBELLIFERAE

Part I. *Ligusticum stewartii* (Hiroe) E. Nasir Seed Oil

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(Received November 14, 1985)

The essential oil of the seeds (yield 1.88%) of *Ligusticum stewartii* (Hiroe) E. Nasir, a wild Umbellifer of Pakistan, was analysed to total hydrocarbons (32.26%) consisting of α -pinene (8.43%), camphene (0.68%); β -pinene (3.26%); myrcene (2.84%); Δ^3 -carene (1.67%); *p*-cymene (0.24%); limonene (8.37%); γ -terpinene (2.86%) and unknown sesquiterpenes (1.02%); a mixture (48.50%) of alcohols and esters, viz. linalool (1.56%); phenylethyl alcohol (2.31%); geraniol (6.23%); terpineol (26.14%); borniol (9.56%); bornyl acetate (1.50%); geranyl acetate (1.20%), mixture (17.3%) of coumarins and resinous materials of unknown composition and tarry matter (1.94%).

POST HARVEST LOSSES IN VEGETABLES

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(Received April 4, 1985; revised January 28, 1986)

Post-harvest losses in vegetables have been studied. The maximum (52%) quantitative loss was recorded in spinach of which 25% was at retailers' shop. Proximate analysis of vegetables at different maturity stages indicated that the nutritional composition of vegetables were species specific and maturity dependent. Protein contents of leafy vegetables were high (25-46%) at immature stage while roots and tubers indicated high (6.9-13.7%) protein contents at over mature stage. Leafy vegetables accumulated more sodium and potassium as compared to the rest of the vegetables. Vitamin contents of all the vegetables were high at mature stage and indicated significant losses during storage.

DIFFUSION EXTRACTION OF TOXIC FACTOR FROM MUSTARD SEED

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(Received February 17, 1985; revised April 2, 1986)

A process is described for the diffusion extraction of glucosinolate (the precursor of a toxic factor) from three *Brassica juncea* varieties of RL-18, poorbi Raya, and S-9 seeds. Diffusion extraction resulted in the elimination of glucosinolate to undetectable limits. Minor changes in oil, fibre and ash contents were due to extraction of soluble fractions with ethanolic-NaOH. The detoxified mustard seed meal showed higher recovery of 82.5 to 92.3 % and 89.1 to 95.4 % on weight/weight and protein/protein basis. The preboiling of RL-18 seed prior to diffusion extraction improved the NPU and PER of mustard seed meal from 48.3 to 52.0 % and 1.61 to 1.70 % respectively. The detoxified mustard seed meal could be incorporated into poultry feed.

A SURVEY OF THE NEMATODE PROBLEM OF TOBACCO IN PAKISTAN: (A) NURSERIES

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(Received October 8, 1985; revised April 17, 1986)

Seventy nine nurseries of tobacco (*Nicotiana tabacum*, *N. rustica*) were surveyed for the presence of nematodes. Plant parasitic forms recovered were *Helicotylenchus indicus*, *Aphelenchus avenae*, *Paratylenchus* spp., *Meloidogyne* spp. *Helicotylenchus canadensis*, *Hoplolaimus californicus*, *H. indicus*, *Hoplolaimus galeatus*, *Helicotylenchus mircolobus*, *Tylenchorhynchus acutus*, *Helicotylenchus pseudobustus*, *Tylenchorhynchus nudus*, *Malenchus exiguus*, *T. acutoides*, *T. canalis*, *Pratylenchus pratensis*, *P. penetrans*, *Aphelenchoides sacchari*, *Pratylenchus coffeae*, *Scutellonema bradys* and *Rotylenchulus reniformis*. This order also shows the intensity of the occurrence of nematodes. With regards to the frequency of occurrence, *Aphelenchus avenae* was the most frequently encountered species followed by *Helicotylenchus indicus*. The least frequent nematode species was *Rotylenchulus reniformis*. Stunting, unthrifty growth and yellowing of seedlings were the above ground disease symptoms. *Helicotylenchus indicus* and *Pratylenchus* spp. are considered to be important pest of tobacco nurseries in the study area. Occurrence of root-knot nematodes only in low number has been believed to be due to the extreme cold conditions of the months during which nursery seedlings are raised. Free-living nematodes found during the survey have also been listed.

**TAXONOMY AND SOME BIOCHEMICAL VALUES OF *CAULERPA TAXIFOLIA*
AND *HYPNEA MUCIFORMIS* COLLECTED FROM KARACHI COAST**

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(Received February 17, 1985; revised April 8, 1986)

Two species of sea-weeds, *Hypnea muciformis* and *caulerpa taxifolia*, belonging to the glasses of red and green algae respectively were selected for studying their morphology and biochemical composition. Nutrients-carbohydrates, protein, vitamin 'C' and inorganic elements- Na^+ , K^+ , Cu and Fe contents were determined and have been reported here.

Key words: Sea Weed; Nutritional Analysis

MICRONUTRIENT STATUS OF THE SOILS OF THE FRONTIER REGION

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(Received September 19, 1985; revised April 8, 1986)

Surface soil samples collected from Swat, Dir and Malakand Agency of N.W.F.P were analysed for total and available (DTPA-extractable) contents of Zn, Fe, Mn and Cu. The micronutrient content was correlated with the soil parameters of pH, organic matter and calcium carbonate contents. The results showed that the available amounts of Fe, Mn and Cu were well above sufficiency levels for optimum crop production whereas the available Zn varied from deficient to sufficient. Twelve percent of the samples were deficient while another 33% were marginal in Zn. A highly significant positive correlation existed between the Zn and organic matter contents. Calcium carbonate appeared to have a dominant negative influence on Fe, but a positive influence on Mn. Except for Zn, the total content of micro-nutrients did not correlate significantly with their available content.

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COMPARISON OF VARIOUS ZINC APPLICATION METHODS AND THEIR EFFECT ON ZINC UPTAKE AND OTHER NUTRIENT ELEMENTS IN MAIZE PLANTS

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(Received July 19, 1985; revised March 24, 1986)

In a glasshouse study, three Zn application methods were tested to correct Zn deficiency in maize. Coating of the maize seed with 1% ZnO of the seed weight and 5 ppm surface applied Zn in solution form proved equally good for 7-week old maize dry matter production. Seed soaking in 5 and 10% ZnSO_4 solution for 3 min was the least efficient for growth promotion. Total Zn contents of the plant tissue increased ($P < 0.01$) by all Zn application methods; however, only surface applied Zn increased plant Zn concentration ($P < 0.01$). Applied Zn antagonised Cu uptake and in general reduced Fe, N and P concentrations, while their total contents increased due to growth improvement.

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DISTRIBUTION OF *BACILLUS THURINGIENSIS* SEROTYPES IN PAKISTAN

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(Received 5 March 1985; revised 5 May 1986)

Distribution of *Bacillus thuringiensis* in Pakistan was investigated and it was found that most of the crystalliferous isolates belong to *Bacillus thuringiensis* sub sp. sotto i.e. 129 out of 150 isolates. Other isolates belong to serotype B.t. alesti (3) B.t. dendrolimus (3), B.t. kurstaki (4) B.t. kenyae (1) and B.t. pakistani (10).

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CHEMICAL EVALUATION OF LIPID CLASSES IN THE FRESH AND STORED COW BUTTER

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(Received August 29, 1985; revised April 30, 1986)

The lipid fractions from fresh and stored butter were found to be (92.0 % and 91.6 %) neutral lipids and polar lipids (7.92 % and 8.4 %) respectively. The main fatty acids in the neutral and polar lipid fractions were palmitic and oleic acids. Amounts of lower fatty acids i.e. C_4 - C_{10} were found only in fresh butter. The enzymatic hydrolysis of the triacyl glycerol fractions showed that they contained large amounts of oleic acid at the Sn-2-position. Palmitic, stearic and other saturated fatty acids were almost exclusively distributed in the Sn-1 and Sn-3 positions. Oleic acid represented 75.5 % and 81.8 % of the fatty acids at the Sn-2-position in fresh as well as in stored butter respectively.

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PRODUCTION OF MARINE CHEMICALS IN PAKISTAN

Part I. Sea Salt and Deterioration of its Quality

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(Received January 1, 1985)

Production of sea salt by solar evaporation has been described with respect to the physical conditions prevailing on the coastline, capacity and location of salt works and methods adopted for salt crystallization. The factors contributing to the deterioration of the sea salt industry and of the quality of salt produced there from have been described. The effect of untreated sewage and industrial effluents discharged through Lyari River into Manora channel on the salt works has also been assessed.

**GEOLOGY, EXPLOURATION AND EVALUATION OF THE COMMERCIAL
FEASIBLE GLASS SAND DEPOSITS OF SURGHAR RANGE
(TRANS INDUS SALT RANGE) DISTRICT MIANWALI***

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(Received March 5, 1985; revised November 27, 1985)

Various glass sand deposits of the Datta Formation (Lower Jurassic age) were studied for their suitability for the manufacture different types of glass and ceramic products. Samples No. G.S. 1, G.S. 2 and G.S. 3 shown in the location map can be used for the production of container glasses while samples No. G.S. 4, G.S. 5, G.S. 6 and G.S. 7 are suitable for amber, green and low quality tableware glasses. Samples No. G.S. 6 and G.S. 7 are feasible for casting industries.