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Physical Sciences Section

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ISOLATION AND STRUCTURE OF HOLARRIFINE, A NEW ALKALOID FROM THE BARK OF *HOLARRHENA ANTIDYSENTERICA* LINN.

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(Received December 20, 1988)

A new alkaloid, provisionally named as holarrifine has been isolated from the fresh, undried bark of *Holarrhena antidysenterica* and its structure elucidated through chemical and structural studies.

Key words: Isolation, Holarrifine, New alkaloid, *Holarrhena antidysenterica*. Linn.

STUDIES ON THE OXIDATION OF CAMPHENE TO CAMPHOR

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(Received November 18, 1987; revised January 8, 1989)

Acid catalysed oxidation of camphene to camphor with the dichromates of sodium, potassium and ammonium in aqueous medium at 155-120° has been studied. The effect of variation in reaction time and sulphuric acid concentration has also been studied. The oxidation products were analysed and identified by gas chromatography.

Key words: Dichromates, Camphene, Camphor.

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ROLE OF WATER IN PROTEIN REACTION: VARIATION OF CHARGE ON METHEMOGLOBIN IN WATER AND ETHYLENE GLYCOL MIXTURES

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(Received July 20, 1988)

The net charge on methemoglobin in various water/ethylene glycol mixtures was determined at pH 6. The result showed that there was no significant change in the net charge of the methemoglobin upto 0.122 mole fraction of ethylene glycol in the solvent mixtures. This may be due to the suggestion that the hydrogen — bonding capacity of ethylene glycol and water, with respect to the peptide group, is sufficiently similar so that intrapeptide hydrogen-bonding occurred to about the same extent in the two solvents. Thus the methemoglobin may be predominantly in the aqueous forms. The significant change in net charge as from 0.245 mole fraction of ethylene glycol may be due to possible reversible exposition of an ionisable group that was buried at low concentration of ethylene glycol.

Key words: Charge, Methemoglobin, Water/ethylene glycol.

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A CT-BASED SOLID STATE ELECTROCHEMICAL CELL USING PLANT-LEAVES

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(Received November 10, 1988)

The CT-complex forming capability of plant leaves has been used to develop a new type of light, small and economically-viable solid state electrochemical cells with configuration Mg/leafcathod/graphite. The open circuit voltage of 1.7 ± 0.1 volts and short circuit current density of 2.75 ± 0.25 mA/sq.cm. were observed. The Gibbs-Helmholtz equation is used to estimate potential value theoretically. The cell performance indices have also been obtained.

Key words: Solid state batteries, Superionic conductors, Charge-transfer complexes, Power and energy densities.

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A TEXTURAL STUDY OF NEARSHORE RECENT SEDIMENTS, MAKRAN COAST, PAKISTAN

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(Received May 29, 1988; revised January 2, 1989)

Recent sediments, accumulating along Makran coast, at ten meter isobath, are terrigenous, low calcareous, silt dominated and of fluvial and eolian origin. They are generally poorly sorted and invariably positively skewed. Clear patterns of sorting characters, along the length of the coast, did not emerge from the present study, partly due to insufficient number of analyses and partly obscured by local variations.

Key words: Marine, Sediments, Makran coast, Texture.

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INVESTGATION OF INVERTASE ACTIVITY FROM *OXYSTELMA ESCULANTUM* R. BR. PLANT

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(Received November 10, 1988, revised January 22, 1989)

Invertase activity was determined in crude extract of *Oxystelma esculantum* R. Br. plant by the use of sucrose as a substrate. The optimum pH and temperature was found to be 5.5 and 30° respectively. Vitamin C, potassium cyanide and cobalt chloride stimulated 15.0, 25 and 25% activity whereas marked decrease in invertase activity occured with CuSO_4 , urea, calcium chloride and EDTA (87.5, 75, 75 and 62.5%) respectively.

K.

HALOMERCURY ACETALDEHYDE AS ANTI-FUNGAL AGENT FOR POLY (VINYL ACETATE) EMULSIONS

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(Received December 10, 1987)

Organomercury compounds prepared from vinyl acetate monomer itself i.e. chloro, bromo and iodo mercury acetaldehydes were found most suitable as antifungal agents for poly (vinyl acetate) emulsions containing more than 50 % solids.

The antifungal tests were carried out on common out door and indoor fungi such as; *Aspergillus niger*, *Aspergillus flavus* and *Pencillium* spp. The results were compared with the known standard compounds currently in use such as pentachlorophenol and phenyl mercury acetate. Their activities can be rated as iodo > bromo > chloro mercury acetaldehyde.

Key words: Fungicide, PVA emulsion, Halomercury acetaldehyde.

PREPARATION OF FERRIC CHLORIDE FROM IRON ROLLING SCALE BY OXIDATION Part I

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(Received August 9, 1988, revised January 22, 1989)

Preparation of iron (III) chloride from rolling scale in 12N hydrochloric acid and in turn oxidation with dried chlorine gas was carried out. Effects of temperature and time of oxidation were also studied. It was found that 70% of Iron rolling scale, dissolved in 12N Hydrochloric Acid at 60°, yield crystalline ferric chloride, when oxidized with dried chlorine gas.

Key words: Ferric Chloride, Iron rolling scale, Oxidation.

Biological Sciences Section

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PHOSPHATIDE ACYL-HYDROLASE AND TRIGLYCERIDE ACYL-HYDROLASE ACTIVITIES IN THE DEVELOPING SEEDS OF CASSIA SPECIES

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(Received May 5, 1986; revised December 31, 1988)

Variations in the activities of phosphatide acyl-hydrolase and triglyceride acyl-hydrolase with mature as well as developing seeds of *Cassia absus*, *Cassia fistula* and *Cassia occidentalis* were studied. Both the mature and developing seeds showed the presence of two acid lipase with pH optima 3.0 and 4.0 and a phospholipase with pH optimum 5.6 during maturation the lipase activities decreased from 7.6 μ U and 6.3 μ H per 20 seeds per hour in *C. absus* and *C. occidentalis* (both at 12 weeks after flowering WAF), to 3.3 μ U per 20 seeds per hour (both at 12 WAF). In *C. fistula* the reduction was from 5.64 μ U to 3.84 μ U per 20 seeds per hour between 4-24 WAF. The activities of phospholipase were increased in the maturing seeds of the three species. The relative activities of the two enzymes studied in the various solvent systems were found to be similar.

Key words: Phospholipase, Phosphatide acyl-hydrolase, Triglyceride acyl-hydrolase.

STUDIES OF THE ESSENTIAL OIL OF THE PAKISTANI *LAURUS NOBILIS* LINN IN DIFFERENT SEASONS

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(Received November 18, 1987; revised January 18, 1989)

The essential oil of the leaves of *Laurus-nobilis* commonly known as bay oil has been studied for its physico-chemical properties and chemical composition. The leaves afforded 0.13 to 0.36% of the oil. The relative percentage of different terpenes in the oil and their characterisation was carried out by gas chromatography. The identified terpenes are, α -thujene 0.29, α -pinene 2.74, camphene 0.06, sabinene 6.2, β -pinene 2.05, myrcene 0.03, phellandrene 0.55, carene, 0.15, *P*-cymene 0.7, cineole 44.12, γ -terpinene 0.48, α -thujone 0.48, β -thujone 0.36, Linalool 0.35, terpinolene 1.90, fenchol 0.12 camphor 0.15, dihydroterpineol 0.35, 4-terpineol 3.60, α -terpineol 2.19, citral 0.33, geraniol 0.05, terpinyl acetate 0.11, eugenol 15.16, linalyl acetate 0.05, methyleugenol 2.48, caryophyllene 0.06 and acetyleneugenol 0.42% as shown in the bay leaves collected in the month of November.

Key words: Essential oil, *Laurus nobilis*.

STUDIES ON SOME BIO - ECOLOGICAL ASPECTS OF THE CITRUS BUTTERFLY *PAPILIO DEMOLEUS* L. (LEPIDOPTERA : PAPILIONIDAE) IN THE BARANI ECOLOGY OF PAKISTAN

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(Received October 27, 1988; revised January 19, 1989)

In an artificial population of *Papilio demoleus* L. in a citrus orchard of the rainfed (barani) areas of Pakistan, duration of the five larval instars of the insect were 3, 3, 3, 3, and 4 days respectively while the pupal duration was 13 days. The adults longevity was about a week and females started laying eggs on the third day of emergence. The first and the second generations were completed in 33 and 36 days respectively. Out of 1180 eggs inoculated 60% of them hatched to 1st instar larva. Mortality during larval instars was low and suddenly increased at pupal stage. The single important mortality factor was the pupal parasite, *Pteromalus puparum* L. (Pteromalidae : Hymenoptera). On the basis of mortality data, survivorship curves for barani population of *P. demoleus* were prepared.

Key words: Citrus butterfly, Bio-ecology, Rain fed area

EFFECT OF SOWING DATES ON THE GROWTH AND YIELD OF WHEAT CULTIVARS

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(Received May 29, 1988; revised January 4, 1989)

A field experiment was carried out to evaluate the effect of sowing dates on the growth and yield of wheat cultivars at the agronomy experimental field, (A.R.I.) Tandojam, during the winter of 1986-87. Six sowing dates viz. 1st. Nov, 10th Nov., 20th Nov., 1st., December, 10th December and 20th December with the wheat cultivars, M-141, M-154, M-5/84, and Pavon were studied. Crop sown from 1st. November to 1st. December, produced significantly higher yields, mainly due to increase in all yields components. However further delay in sowing suppressed the yield, caused by reduction in the yield contributing traits like, number of tillers, grains per spike, seed index, and grain yield/plant. The cultivars M-154, M-5/84 and Pavon produced higher yields than did M-141.

Key words: Sowing dates, Wheat cultivars, Yield components.

**EFFECTS OF PHENYLMERCURIC ACETATE AND WATERLOGGING ON
LEPTOCHLOA FUSCA (L.) KUNTH (KALLAR GRASS)
Part II. Salt Relations**

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(Received October 4, 1987; revised December 28, 1988)

Studies were conducted to characterise Na^+ and Cl^- extrusion by the leaves of 'Kallar' grass subjected to treatment with phenylmercuric acetate (PMA) and to various moisture levels in the soil. Application of PMA did not have any substantial effect on the extrusion of Na^+ and Cl^- by the 'Kallar' grass leaves. The amounts of Na^+ and Cl^- extruded by the leaves substantially increased 72 hours after treatment with increasing NaCl concentration in the medium both at flooding and at field capacity. However, this trend was reversed at water deficit. Low availability of water seems to have affected transport of salts to the leaves and their subsequent extrusion.

Key words: Phenylmercuric acetate, Waterlogging, Kallar grass, Salt relations.

COMPARATIVE QUALITY STUDY OF TOASTED CORN AND SOYBEAN

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(Received October 13, 1988; revised January 22, 1989)

Toasted corn and soybean grains were compared for their proximate content and organoleptic characteristics when stored in polyethylene bags for 30 days at room temperature. Toasted soybean grains contained more ash, fat and protein content whereas moisture content and peroxide values were higher in toasted corn grains. Organoleptically, toasted soybean grains were superior to that of corn grains as far as appearance, texture and flavour were concerned. Results clearly suggest that by virtue of their superiority nutritionally as well as sensorily, toasted soybean grains can easily replace toasted corn grains.

Key words: Toasting, Proximate composition, Organoleptic attributes.

YIELD AND WATER USE OF WHEAT AS AFFECTED BY WATER STRESS

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(Received October 22, 1988; revised January 21, 1989)

The experiment was carried out during December 1986 through March 1987 in the field under natural environmental conditions to study the effects of soil water stress applied at various stages of growth on the yield and water use of wheat (*Triticum aestivum* L. cv. 'Piuc'). Soil water stress treatments consisted of single period without irrigation. Soil water deficit increased progressively in all the stress treatments during the advance of the drying period, with the maximum obtained when the crops were subjected to water stress from booting to flowering stages. The highest cumulative evapotranspiration was found when stress was imposed at shooting due to development of late tillers after the termination of water stress. Crops undergoing water stress during vegetative phase regained a rate of evapotranspiration similar to that of the fully irrigated immediately after the termination of water stress. Water stress at all growth stages studied reduced the grain yield and water use of wheat significantly, but the effect was maximum when stress occurred from booting to flowering stages. Water use efficiency for grain production was highest for the fully stressed crops and lowest for fully irrigated crops. The increases in water use decreased the water use efficiency but increased harvest index.

Keywords: Wheat, Yield, Water use, Water stress.

Short Communication

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**EFFECTS OF SUCROSE ON SEED GERMINATION OF IPIL IPIL (*LEUCAENA LEUCOCEPHALA* L)
AT DIFFERENT SALINITY LEVELS**

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Technology Section

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EXTRACTION OF IRON, ALUMINA AND TITANIA FROM ZIARAT LATERITE

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(Received August 5, 1986; revised December 13, 1988)

Experiments were conducted on the extraction of iron, alumina and titania from Ziarat laterite by reduction sintering and leaching operations. The effects of the variation of laterite, coke soda and lime were studied using two processes. In two stage process the recoveries of iron and alumina were 88 and 80 respectively whereas in single stage process the recoveries were low. There was, however, no difference in the recovery of titania in the two processes.

Key words: Alumina, Ziarat, Laterite.

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STEAM REFORMING OF ETHANE OVER A NICKEL-ALUMINA CATALYST

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(Received November 1, 1987)

The aim of the present work was to study the steam reforming of ethane at low temperature and atmospheric pressure. A commercial reduced nickel-alumina catalyst was used for all the experiments over a range of temperatures from 300-500°. The primary object was to employ higher steam ratios at low temperatures in the catalytic steam reforming of ethane in order to optimise conversion and yield of the products. This was done in a packed bed reactor with continuous flow of both reactants. After condensing out the excess water the product gases were dried and analysed by infrared analysers and chromatographically.

Keywords: Catalytic, Steam reforming, Alkanes.

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GROUND COAT ENAMEL FOR STAINLESS STEEL

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(Received February 28, 1988; revised January 12, 1989)

Refractory ceramic base coatings were formulated and developed for application to low-carbon steel. These coatings would protect this metal from oxidation, deterioration and avoid reduction of the cover-coat enamel by the stainless steel. Several of the coatings developed for iron were successfully applied to stainless steel. Indigenous raw materials such as quartz, feldspar and fluorspar which form the greater part of ground coat batch compositions have been used.

Key words: Enamel, Ground coat, Ceramic.