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Physical Sciences Section

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THERMODYNAMIC STUDIES ON THE IONIZATION PROCESS OF PROPIONIC ACID IN METHANOL-WATER MIXTURES

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(Received July 6, 1987; revised February 12, 1989)

The ionization processes of propionic acid in methanol-water mixtures at various temperatures were studied using conductometric technique. Propionic acid becomes less ionized as the proportion of methanol increases in the mixture, i.e., as the dielectric constant decreased. The results were reported in view of thermodynamic, where the ionization processes are exothermic ones. The conductance technique is one of the famous accurate methods for determining the ionization constants of a weak acid.

Key words: Conductance, Thermodynamics, Ionization.

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POTENTIAL ENERGY CALCULATIONS OF TREPTILAMINUM: AN ANTICHOLINERGIC DRUGS

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(Received November 13, 1988, revised December 17, 1989)

Semiempirical conformational energy calculations were performed for the treptilaminum and only non bonded interactions are considered. The calculations suggest that treptilaminum adopts limited allowed conformations. It is likely that a mixture of conformational states for the interaction with the receptor.

Key words: Potential energy, Treptilaminum, Energy calculation.

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POTENTIAL ENERGY CALCULATIONS OF PIPERX AND DEXITIMIDE

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(Received January 17, 1987; revised November 30, 1988)

The conformations of piperx and dexitimide have been investigated. The present calculations suggest limited allowed conformations for both molecules. The calculations suggest that the largest differences in A and B are the internal rotations around bonds $C_{17} - N_2$ and $C_{17} - C_{18}$ for allowed conformations (dexitimide). The potential energy calculations indicate that there are serious type of overlapping for the pairs C_{13}—C_5 and C_{13}—C_4 at $W_1 = 120^\circ$. The allowed regions for the conformations is at $W_1 = 0 - 120^\circ$, 300-360° (Wisanine).

Key words: Potential energy, Piperx, Dexitimide.

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INDIRECT SPECTROPHOTOMETRIC DETERMINATION OF PALLADIUM (II)

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(Received October 15, 1988; revised February 9, 1989)

An indirect spectrophotometric determination of Palladium is described. The method is based on the chemical reaction between metallic mercury and bivalent Palladium to form an equal amount of mercurous ions. The mercurous ion is further oxidised to mercuric which is measured spectro-photometrically by dithizone method. Various experimental parameters have been studied. The method is found useful for estimating Palladium in dental alloy, jewellery metal and catalysts.

Key words: Palladium (II), Indirect photometric method, Extraction.

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PARTITION INVESTIGATIONS OF SALICYLIC ACID BETWEEN AQUEOUS AND DIFFERENT ORGANIC PHASES AT VARIOUS TEMPERATURES
Part. I

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(Received February 29, 1988; revised February 14, 1989)

Distribution of salicylic acid in 'A', 'B', 'C' and 'D' systems has been investigated at seven temperatures ranging from 20 to 50°. The distribution coefficients (K_1's) of undissociated monomeric salicylic acid between aqueous and nonaqueous phases and equilibrium constants (K_{12}'s) for dissociation of salicylic acid dimers to monomers in organic layers have been evaluated at each of the seven temperatures.

Thermodynamic data ($\triangle H^o$, $\triangle G^o$, and $\triangle S^o$) for distribution of the acid in each solvent pair and dissociation of the dimerized salicylic acid in each organic solvent at each temperature have been calculated. The values of distribution and dissociation constants have been found to increase with rise in temperature in all cases except in "A" system, where they show decrease with increase in temperature. These constants are found to increase with increase in dielectric constants of the solvent as well.

Key words: A = Water-carbon disulphide; B = Water-carbon tetrachloride; C = Water-benzene and D = Water-chloroform systems.

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ESTIMATION OF SOME CHEMICAL FACTORS IN THE WATER SAMPLES COLLECTED FROM DIFFERENT PARTS OF SIND AREA

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(Received August 16, 1987; revised February 2, 1989)

Water samples were collected from 24 localities and 120 stations from the province of Sind to isolate the eurythermic strains of fresh water phytoplankton. One hundred twenty samples were analysed for dissolved oxygen, free carbon dioxide, ammonia, nitrate, nitrite, silica, manganese and inorganic phosphorus present in the aquatic habitates.

It was noted that *Chlorella vulgaris, Chloroceum humicola, Scenedesmus dimorphus, Scenedesmus quadricauda* and *Monoraphidium contortum* appear to be resistant to fluctuation in the concentration of the above chemicals in the water body from different localities of Sind. Significant variations among chemical constituents were observed (Table 1).

Keywords: Estimation, Chemical factors, Water samples.

Biological Sciences Section

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THEORETICAL APPROACH TO LIFE PROCESSES
Part I. Propagation of the Processes by Water and Inhibition by Alcohol

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(Received February 21, 1988; revised February 4, 1989)

The role of water has been described in terms of a medium, propagating chain formation in life processes by virtue of an extensive hydrogen bond system. Alcohol also has a hydrogen bond system which could impart it a similar role. However, it does not have the solvent character nor transport capability to carry the vital ions required for the maintenance of cell equilibria. This is because of a reduction in the dielectric constant and capability for interaction with amino acids to form esters. It therefore, enters the living body as a toxic material and is biotransformed by the enzymic processes.

The mechanism of chain propagation and inhibition has been discussed in the light of the hypothesis on coordination polymer formation. It has been suggested that for assimilation the inputs of the living body should be hydrogen-bondable and they should not react unfavourably with the medium and/or the products of body reactions. Alcohol fulfils the first criterion and hence is easily assimilated. However, since it does not fulfil the second it has to be biodegraded. The bio-degradation process which proceeds through the alcohol dehydrogenase enzyme has been discussed with regard to the proposed mechanism.

Key words: Aging, Life process, Water, Alcohol.

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THEORETICAL APPROACH TO LIFE PROCESSES
Part II. Propagation of Plant Life and Nutrient Uptake

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(Received March, 3, 1988; revised February 4, 1989)

A hypothesis is presented for propagation of plant life suggesting that entry of a nutrient into and its assimilation by a plant system takes place if the former has hydrogen bondable groups as its integral part and the latter has ingrained coordination polymers, also having hydrogen bondable groups at their periphery or surface. Membranes which are responsible for controlling ionic movements, their reaction rate and energy requirements are suggested to comprise a set of coordination polymers containing specific metal ions for selective absorption and/or transportation of organic molecules and ions. Carriers react with an ion at the hydrated surface, transport it across the membrane and release it inside the cell. The cells themselves are considered as coordination polymers having Na^+ and K^+ on exchangeable sites. The movement of cations through cells follows the laws for conducting electrons through semiconducting crystals. Electrolytes combine with substances having a hydrogen bond such as HX of the protoplasm. The coordination polymers function as ion binding and ion releasing complexes by the exchange processes such as those occurring in ion exchange resins. Changes in pH and ionic concentration determine the entry and/or assimilation of nutrients into a macromolecule through hydrogen bondable sections.

Key words: Ions, Plant life, Nutrient.

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REDESCRIPTION OF A LITTLE KNOWNAELIINE GENUS *GULIELMUS* DISTANT (HEMIPTERA: PENTATOMIDAE: PENTATOMINAE) WITH SPECIAL REFERENCE TO MALE AND FEMALE GENITALIA

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(Received August 31, 1988; revised February 16, 1989)

A little known genus *Gulielmus* distant is redescribed alongwith its two known Distant's species *G. laterarius* and *G. marmoratus* from India with special reference to their metathoracic scent gland complex, male and female genitalia. The above species are keyed and the relationships of the included taxa in this light are also birefly discussed.

Key words: Redescription, *Gulielmus*, Genitalia.

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ON THE BIOCHEMICAL COMPOSITION OF TEN SPECIES OF THE GENUS *CAULERPA*, (CAULERPALES – CHLOROPHYTA), COLLECTED FROM KARACHI COAST

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(Received September 30, 1987; revised February 11, 1989)

This paper deals with the biochemical composition of a set of ten species of sea weed belonging to the genus *Caulerpa* of class Chlorophyceae (green algae), studied during 1985–87. Protein, cholesterol, triglycerides, phospholipids, nitrogen, iron, ash and total fat have been estimated. Significant variations were observed in some of the constituents among ten different species of the genus *Caulerpa*.

Key words: Caulerpa, Biochemical, Karachi.

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STUDIES ON GASTROPODA (*MONODONTA AUSTRALIS*) FOUND AROUND THE KARACHI COAST: EFFECTS OF SEASONAL VARIATIONS ON BIO-CHEMICAL COMPONENTS

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(Received August 8, 1988; revised January 3, 1989)

The effects of seasonal variations on protein, fat, ash, moisture and glycogen of *Monodonta australis* of Karachi coast have been studied. This report has been based on the data collected for a period of one year. Protein and glycogen contents varied significantly was noticed, while fat and ash contents remained constant during the study.

Key words: Monodonta australis, Mollusc, Seasonal variations, Biochemical composition.

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STUDY ON THE MICROBIOLOGICAL STATUS OF DIFFERENT VARIETIES OF LOCAL FOOD

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(Received July 19, 1987; revised February 14, 1989)

Different varieties of raw, cooked and pre-packed foods abundantly available from local food catering sources were tested for their microbiological status. The incidence study included, *Salmonella, Shigella, Escherichia coli,* Yersinia enterocolitica, *Pseudomonas, Vibrio cholerae* and related vibrios, *Vibro parahaemolyticus, Clostridium botulinum, Clostridium perfringens, Bacillus cereus, Staphylococus aureus, Streptococcus, Brucella, Mycobacterium* and *Lactobacillus acidophilus.* The most common micro-organism found in food samples was *Escherichia coli,* with a frequency of occurrence 48.5%. Foods in the 'raw food' class were found to be the contaminated upto 77.7%. This class included chicken, beef, fish mutton, vegetable, fruit, salad, chatt and canned food. This large scale microbiological contamination might be attributed to almost non-existing food regulatory standards and ill-maintenance of good hygienic conditions.

Key words: Food analysis, Microbiological status of foods, Food contamination.

INTRODUCTION EXPERIMENTAL

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SEED-BORNE FUNGAL PATHOGENS OF MAIZE IN PAKISTAN

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(Received November 7, 1988; revised February 14, 1989)

Most fungal pathogens of maize are seed-borne and cause rotting and discolouration of corn seed. In view the importance of the maize seed and maize based starch industries, studies of the seed-borne fungal pathogens of maize were initiated in 1985-86 by the Federal Seed Certification Department, Islamabad. Fifty seven seed lots were tested by blotter paper method during 1985-86. Seven seed-borne pathogens were recorded. The incidence of seed-borne fungal pathogens varied in individual cultivars in different years. *Fusarium moniliforme* was recorded in all the seed lots at percentage up to 98.5%. *Cephalosporium acremonium, Drechslera maydis* and *Fusarium semitectum* were found in proportions of 14.0, 6.0 and 11.0 percent in the varieties, Akbar, Neelum and Sarhad white respectively. Other pathogens such as *Fusarium equiseti; F. oxysporum, Macrophomina phaseolina* and *Nigrospora oryzae* were recorded at low incidence (2.5%). For establishing disease tolerances in Pakistan, a study of the biology of the pathogens is needed.

Key words: Seed-borne pathogens, Blotter paper method, Maize.

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EFFECT OF SALT STRESS ON GROWTH OF TOMATO

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(Received May 3, 1988; revised February 4, 1989)

A glasshouse experiment in gravel beds, was conducted to evaluate the response of tomato cultivars to varying levels of salinity. Three tomato cultivars 'Marglobe', 'Marmande' and 'Roma VF' were grown at four salinity levels. The gravel bed was salinized prior to transplanting by irrigating with tap water supplemented with NaCl and $NaHCO_3$. Salinity concentrations of irrigation water were control 41.8, 63.14, 97.05 and 132.23 m mol^{-1}. The fruit yield, number of fruit and weight per fruit of all the three tomato cultivars were significantly decreased with the increase in salinity levels. Concentrations of Na, N and K increased in plant leaves with increasing salinity, whereas the concentrations of P, Ca, Fe and Mn decreased.

Key words: Salt stress, Tomato, Plant nutrients.

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EVALUATION OF *BACILLUS THURINGIENSIS* BERLINER AGAINST CHICKPEA POD-BORER

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(Received June 26, 1988; revised January 26, 1989)

Commercial preparations of Bactospeine (Bactospeine WP 16000 IU serotype H-3a3b) and a USDA standard strain HD-1-S-1980 were evaluated in different concentrations against the 1st and 3rd instar larvae of chickpea (*Cicer arietinum* L.) pod-borer (*Heliothis armigera* (Hubn.)). Both the toxins were found equally effective at same larval stages but each one was found more effective against the 1st larval instar. Both the toxins showed similar toxicity at 7 and 11 days exposure periods against the 3rd instar larvae.

Key words: Bacillus thuringiensis, Heliothis armigera, Cicer arietinum.

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GREEN ALGAE AS A PROTEIN SOURCE IN ANIMAL FEED

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(Received August 8, 1988; revised February 2, 1989)

Green alga predominantly *Chlorella spp.*, which grows wildly in waste alkaline water (pH 8.5 to 9.8) were harvested from different sites in Peshawar and Nowshera (NWFP) in both spring and winter seasons. Composite samples from each locations were dried and analysed for their protein, amino acids and mineral composition. It was found that dried algae contained 45 to 51% crude protein (Kjeldhal N x 6.25), which was rich in lysine and threonine, but deficient in methionine and cystine (sulphur) – containing amino acids). The ash content varied from 6.8 to 7.7% with a mean calcium, phosphorus and iron contents of 2.0, 5.2 and 1.0 g/kg. It was concluded that green alga is an adequate protein and mineral supplement in animal feed, and in poultry rations.

Key words: Algae, Protein, Animal feed.

Short Communication

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CULTIVATION OF SYMBIOTIC MICRO-ORGANISMS UNSUCCESSFUL AS DUE TO PEROXIDES FORMED BY SMEARED TISSUE

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(Received January 3, 1989)

Tissues contain fats and when smeared give rise to peroxides. These are antibacterial and also injurious to healthy body cells. Tissues containing symbiotic germs, when smeared, likewise produce antibacterial peroxides and prevent isolation of germs. But leaving a piece of intestine of insects, in the midst of smears of tissue with germs, serves as reducing centres and counteracts the action of peroxides. Tissue smears with pieces of intestines left in the culture plates enable successful isolation of symbiotic germs. The role of peroxides in human pathology has been properly expounded in Bradford Research Institute in California.

Keywords: Germs, Antibacterial, Peroxides.

Technology Section

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A STUDY OF THE PERFORMANCE OF A DOWNCOMER

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(Received July 3, 1988; revised January 26, 1989)

Performance of a downcomer, using O_2-air-aqueous glycerine system 50% by wt. has been investigated. Mass transfer efficiencies and mean residence time, have been measured as a function of liquid and air flow rates. It has been demonstrated that downcomer does play a significant role in the mass transfer, in a unit, therefore a serious thought should be given while designing a downcomer.

Key words: Downcomers, Sieve trays, Mass transfer plates.

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PRODUCTION OF MARINE CHEMICALS IN PAKISTAN
Part III. Studies on the Recovery of Magnesium Sulphate by Chilling

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(Received October 18, 1988; revised January 14, 1989)

Results are reported on recovery of $MgSO_4$ by chilling of sea water bittern using the design of the chiller as well as cooling temperatures as the two important variables. Data are presented for chillers of four different capacities from which it appears that $MgSO_4$ can be effectively recovered by cooling bittern to –5°, the temperature at which the concentration of this salt reduces to zero. These studies also indicate that recoveries can be enhanced if [1] arrangements are made for speedy removal of the crystals from the bulk phase of the liquid and [2] jackets are provided instead of coils in the chilling units.

Statistical analysis of the data reveals that during cooling of $MgSO_4$, there exist linear relationships between [1] concentration and temperature and [2] recovery and temperature which holds good to 95% confidence level. In the former case, the relationship is independent of initial feed concentration and the equipment design whereas in the latter the concentration range is a parameter. Nevertheless, heating affects the two relationships.

Key words: Chilling, Sea bittern, Reaction design.

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NEUTRAL LIPID FRACTIONS AND FATTY ACID COMPOSITION OF *CALLISTEMON LANCEOLATUS* DC. BERRIES OIL

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(Received November 14, 1988; revised February 15, 1989)

Callistemon lanceolatus seed oil (2.8%) has been examined for its physico-chemical values and fatty acid composition. Thin layer chromatography of the oil into lipid classes, resulted into neutral lipids (98%), polar lipids (2%). Fractionation of the neutral lipids afforded hydrocarbons (2.3%), wax esters (1.8%), triglycerides (86.9%), free fatty acids (2.8%), diglycerides (2.4%), and monoglycerides (1.8%). The oil is found to contain caprylic (0.8%), lauric (0.7%), Myristic (0.1%), palmitic (9.3%), stearic (1.6%), oleic (12.3%), linoleic (74.5%), linolenic (0.2%) arachidic (0.3%) and behenic (0.2%) acids.

Key words: Neutral, Lipid, *Callistemon lanceolatus*, Composition.

INTRODUCTION

mm (kieselgel 60 G Art. 7731). Chromatograms were de-

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CHEMICAL SEASONING AND DIMENSIONAL STABILIZATION OF WOOD

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(Received May 4, 1988; revised February 1, 1989)

Formulations of hygroscopic salts, formalin and molten wax have been applied to four woods viz. Babul, Siris, *Eucalyptus* and Pakar, available in Pakistan and alteration, if any, in their dimensional stability have been recorded. Simple soaking in solutions (Non-Pressure Treatment) has been found to improve the quality of some of these inferior woods. Studies with regard to moisture absorption, shrinkage and swelling, chemical retention and leaching carried out on untreated and treated specimens of different woods indicate that thiourea and formalin which are effective in cross-link formation create the desired hydrophobic micro-environment and hence are appropriate for their dimensional stabilization. Hygroscopic salts on the other hand comprise the hydrogen-bondable materials and on interaction with the polysaccharides and lignins of the woods provide the desired hydrated environment for chemical seasoning. The results have been found to be in accord with the theory which holds dehydration as the main mechanism for aging of plants.

Key words: Hygroscopic salts, Formalin, Molten wax, *Eucalyptus*