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Physical Sciences Section

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CATIONIC COPOLYMERIZATION OF VINYL TOLUENE AND α -PINENE

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(Received October 7, 1987; revised March 1, 1988)

A study of cationic copolymerization of vinyl toluene and α -pinene in benzene has been undertaken at 10° using anhydrous $AlCl_3$ as catalyst. Both monomers combine in all monomeric ratios to form copolymer. A copolymer of 2215–3540 molecular weight is obtained. α -Pinene partially acts as chain transfer agent. The copolymer is a solid substance of unreacted monomers are completely separated. It softens at 75–80°. The copolymer may be used as plasticizer and tackifying agent in compounding natural and synthetic elastomers for coating and all type of adhesives.

Key words: Steric hindrance, Plasticizer, Chain transfer agent.

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OXIDATION OF MOLASSES TO PRODUCE OXALIC ACID

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Oxalic acid was produced on laboratory scale by the oxidation of sugar cane molasses in 65.3 % yield. The oxidation was carried out with nitric acid (65 %) at 60-65° in the presence of catalytic amounts of vanadium pentaoxide (0.005-0.01 %) and tungstun oxide (0.05-0.06 %) as a co-catalyst. The reaction conditions were optimised first on sucrose and then the standardised oxidation procedure was applied on purified molasses. The studies were aimed at producing oxalic acid on industrial scale in the country. The difficulties involved and the conditions of the oxidation reaction are discussed here.

Key words: Oxalic acid, Molasses, Oxidation.

A METHOD FOR THE ANALYSIS OF SECONDARY CARBAMATE PESTICIDES

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A modified micro-kjeldahl distillation method has been successfully employed for the determination of secondary carbamates in technical material and in formulations. Methylamine, released on alkaline hydrolysis of sample, is steam distilled and absorbed in boric acid solution, which is titrated with hydrochloric acid using bromocresol green as indicator. The method has been used extensively with accurate and reproducible results for quality control of secondary carbamates. The method can determine these compounds down to a minimum of 0.02m mole of active ingredient.

Key words: Pesticide, Carbamate.

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CO-CURRENT MASS TRANSFER STUDIES IN A PACKED COLUMN

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The extraction of succinic acid with *n*-butanol was studied in a packed column run counter-currently. A rapid approach to equilibrium was noticed. The stage efficiencies ranged from 76 – 97% for contact times of between 18 and 32 sec. Overall mass transfer coefficients based on both phases were similar and positively influenced by increase in total throughput.

Values of overall heights of transfer units were also similar for both phases (0.21 – 0.61m), but lower than the corresponding literature values for counter-current works.

Keywords : Mass transfer, Succinic acid, Packed column.

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THE ELECTROREDUCTION OF SOME ARYLIDENE DERIVATIVES OF SALICYLIC HYDRAZIDE IN BUFFER SOLUTIONS AT THE DME

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(Received January 18, 1987; revised July 9, 1987)

The electroreduction of some arylidene derivatives of salicylic hydrazide is investigated in buffer solutions of different pH values. The reduction involves the uptake of four electrons in acid solutions and two electrons in alkaline media. The number of electrons consumed is calculated from the wave height and confirmed by coulometric analysis. The electrode reaction is also explained. The kinetic parameters of the electrode process are determined and the substituent effect is discussed.

Key words: Polarography of hydrazone, Aryl hydrazone, Arylidene salicylic hydrazide.

CHARACTERIZATION OF WATERS

Part II. Chemical Composition of Hub Dam Water and its Variations

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(Received December 1, 1987; revised March 3, 1988)

Continuous monitoring of the composition of Hub dam water has been carried out for the last eight years, since 1978. Seasonal variations leading to an overall change in the composition have been described by noting the number of rainy days per year and measuring the concentration of chemical constituents viz. calcium, magnesium, sodium, potassium, chloride, sulphate, carbonate and bicarbonate. It has been found that each annual rain in August and February decreases the total salt concentration and that the later has been reduced from an initial value of approximately 1300 mg/litre in 1978 to 350 in 1985. Other factors affecting the composition and quality of dam water like leaching of building materials and quality of soil have also been identified and discussed. Its cationic composition in 1978 was that of ground water having cationic and anionic composition viz. $\text{Na} > \text{Ca} > \text{Mg} > \text{K}$ and $\text{HCO}_3 > \text{Cl} > \text{SO}_4$ respectively which is unlike the Pakistani river water which have their corresponding composition $\text{Ca} > \text{Na} > \text{K} > \text{Mg}$ and $\text{HCO}_3 > \text{SO}_4 > \text{Cl}$. The water as such can be classified as good quality raw water and may be used for industrial and agricultural purposes and human consumption after simple treatment.

Keywords: Hub dam, Chemical composition of water, Seasonal variations.

HEAVY METAL CONTENTS IN SOME SELECTED LOCAL FRESHWATER FISH AND RELEVANT WATERS

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(Received January 16, 1988; revised March 15, 1988)

Concentrations of Mn, Zn, Fe, Cu, Cr, Ni, Pb, Hg, Cd and As in the edible muscle tissue of seventeen species of freshwater fish are estimated by the flame/flameless atomic absorption method. The fish have been selected on the basis of their commercial value from local freshwater lakes/streams and hatchery ponds in Punjab and NWFP. Analysis of the relevant waters in respect of these metals is also conducted to establish correlation between the heavy metal concentration in fish muscles and in water. The concentrations in fish muscle have been found to range from 0.115-11.157, 1.875-50.650, 2.805-180.550, 0.193-7.200, 0.365-13.200, 0.628-38.800, 0.765-45.316, 0.020-26.800, 0.004-1.500, 0.480-7.500 mg/kg, wet weight basis respectively for the above mentioned metals. The study shows a positive correlation between the concentrations of zinc and arsenic in the fish muscle and in water, and the distribution of metals is species-specific irrespective of area of catch.

Key words: Heavy trace metal contents in fish; Freshwater fish analysis.

Biological Sciences Section

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EFFECT OF ICE STORAGE ON FREE AMINO ACIDS OF VARIOUS EDIBLE FISHES

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(Received January 6, 1988; revised March 17, 1988)

Free amino acids (FAA) of six marine fish muscle tissues were separated on polyamide sheet by "Dansylation" in fresh state, after 1 week (8-day) and 2 weeks (15-day) ice storage. Sensory evaluation of the fish tissue was also carried out at appropriate intervals in order to find relationship between the FAA content and the sensory quality during the test period.

The patterns of FAA were found to be characteristic for different species of the fish examined. Predominant FAA present in almost all the fish species examined were : taurine, proline, glycine, alanine, valine, isoleucine, leucine, threonine and serine. During ice storage, the FAA in white pomfret (*Chondroplites sp.*), catfish (*Arius spp.*), flat fish (*Pseudorhombus spp.*) decreased during the 1st week and then increased in the 2nd week. However, in mackerel (*Scomber spp.*), snapper (*Lutjanus spp.*) and Indian shad (*Hilsa spp.*). FAA decreased gradually upto 2 weeks. With the exception of mackerel, the FAA isoleucine, leucine and valine either decreased or disappeared during the 1st week of storage in all other fish examined showing a relationship with sensory properties. No remarkable accumulation of individual FAA was found during ice storage. The ammonia content was also high in all species. No distinct change in taurine content was observed during ice storage.

Key words: Free amino acids, Ice storage, Edible fishes.

AMINO ACID COMPOSITION OF TISSUE PROTEIN FROM FIVE SPECIES OF OYSTERS

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(Received January 26, 1988)

The amino acid composition of tissue protein was studied in five species of oysters, namely, *Crassostrea rivularis*, *C. madrasensis*, *C. glomerata*, *C. tuberculata* and *C. gryphoides* from the coast of Pakistan. Protein hydrolysate of dried whole animal was prepared and component amino acids were determined by amino acid auto analyser. A total of fourteen amino acids were identified in the species studied. Almost all essential amino acids were present except methionine and arginine which could not be detected. Among the species, *C. madrasensis* exhibited higher concentrations of the essential amino acids, lysine, phenylalanine and threonine. Seasonal variation in the bound amino acid content were studied for *C. madrasensis* and *C. rivularis*.

Keywords : Amino acids, Biochemical composition, Oysters.

EFFECTS OF PHENYLMERCURIC ACETATE AND WATERLOGGING ON *LEPTOCHLOA FUSCA** (L) KUNTH (KALLAR GRASS). I. GROWTH

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An experiment was conducted to examine the effects of waterlogging on the growth of 'Kallar' grass grown at two concentrations of NaCl in the soil for 72 hours and sprayed with phenylmercuric acetate (PMA), an antitranspirant. PMA decreased the transpiration rates of 'Kallar' grass leaves 25 % twenty four hours after its application. Seventy two hours after its application some decrease in the transpiration rates was observed with little differences between the treated and non-treated leaves. Increasing NaCl reduced leaf-transpiration in plants grown in the field capacity and water deficit treatments irrespective of with or without treatment with PMA. However, reduction in transpiration with increasing NaCl in the medium was not apparent at flooding. In general, relative water contents were substantially decreased in NaCl treatments. Flooding produced the highest dry weights of plant tops and roots. However, in all water treatments, the application of PMA slightly decreased the dry weights of tops with little or no effect on those of roots.

Key words: Kallar grass, Phenylmercuric acetate, Waterlogging.

INFLUENCE OF PHOSPHORUS APPLICATION IN DIFFERENT PROPORTIONS WITH NITROGEN AND POTASSIUM ON WHEAT YIELD UNDER IRRIGATED CONDITIONS

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(Received July 29, 1987; revised March 9, 1988)

A field investigation was carried out on a sandy clay loam in Lyallpur soil series under irrigated conditions during rabi seasons 1984-85 and 1985-86 on wheat cultivar LU-26S. The application of phosphorus in increasing proportions with nitrogen upto an amount of 100 kg N + 50 kg P_2O_5 /ha significantly improved grain yield and its components. The highest grain yield of 4525 kg/ha and the highest net income of Rs. 5,966/ha with a BCR of 2.22 was obtained with this application.

Multiple regression of yield on its contributing components shows that an increase of one fertile tiller/m², spike length by one centimetre, a grain per spike and 1000-grain weight by one g. would result in an increase in grain yield by 0.1942, 0.1160, 0.1947 and 0.0064 quintal per hectare respectively.

Key words: *Triticum aestivum*, Phosphorus response, Sandy clay loam.

**CEPHALARIA SYRIACA – AN OILSEED CROP FOR THE ARID AND SEMI ARID
AREAS OF PAKISTAN**

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(Received March 12, 1987; revised February 17, 1988)

Cephalaria syriaca Linn (N.O. Dipsacaceae), imported from Turkey, has successfully been grown in Pakistan. With 23 % oil content, the seed yield/hectare has been calculated to be 1600 Kg. The fatty acid composition of the locally grown seed oil has been found to be C_{12:0}, 1.20 %; C_{14:0}, 18.10 %; C_{16:0}, 9.40 %; C_{18:0}, 2.80 %; C_{18:1}, 24.20 %; C_{18:2}, 35.8 %; and epoxy oleic acid 7.30 %.

Key words: *Cephalaria syriaca* arid, Saponification.

Short Communication

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ABROMA ANGUSTA AND ITS HETEROPHYLLIC FOLIAGE

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Technology Section

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STUDIES ON SODA-SULPHUR PULPING

Part II. Pulping of Coconut-leaf Middle-rib (*Cocos nucifera* Linn) by Soda-Sulphur Process

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(Received October 29, 1987)

By using soda-sulphur process of coconut-leaf mid rib (*Cocos nucifera* Linn), a stronger pulp with higher yield in less cooking time was obtained. The pulp may be used for producing writing and printing paper.

Key words: Soda-sulphur, Coconut-rib, Pulping.

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EFFECT OF CHEMICAL TREATMENT ON THE PROPERTIES OF ACTIVATED CARBON FROM INDIGENOUS AGROWASTES

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(Received November 11, 1987; revised February 23, 1988)

The effect of chemical treatment on the physical and chemical properties of activated carbon prepared from different agrowastes has been studied. It has been observed that pretreatment of the raw vegetable material with chemicals lower the bulk density, ash, acid solubles and volatile matter of the product. The activity of the carbon has been determined against iodine, methylene blue and phenol. It has been found that the activity of chemically activated product substantially increases as compared to the untreated one. These carbons may find their use in different industrial purification requirements.

Key words: Chemical treatment, Activated carbon, Agrowastes.

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SUN-DRYING OF APPLES IN THE NORTHERN AREAS OF PAKISTAN

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(Received November 19, 1987; revised March 6, 1988)

A simple technique has been developed for producing, at village level sun-dried apples adequately sulphured comparable to the dehydrated apples. Development of pink discolouration in apples during sun-drying has been controlled.

Key words: Rural apple drying.

STUDIES ON CEMENTITIOUS MATERIALS

Part I. Fat Limes and Portland Cement Mixes

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(Received June 1, 1986; revised March 20, 1988)

The effect of intergrinding fat limes of different origins as dry hydrates and in putty forms on the compressive strength of Portland cement has been studied and compared with standard Portland cement mortar. 30 % Portland cement mixes with hydrated lime in putty form have an average compressive strength of 725 and 1070 psi compared with 645 and 1020 psi after 7 and 28 days respectively for dry hydrates. These results are in conformity with ASTM specifications and suggest that such mixes can substitute upto 30 % of Portland cement in masonry mortars.

Key words: Cementitious materials, Fat lime, Portland cement.

Short Communication

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NEWER APPLICATIONS OF AMARANTHS

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