

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 22, No. 1-2, February - April, 1979

Physical Sciences, Pages 1 - 39

Biological Sciences, Pages 40 - 56

Technology, Pages 57 - 119



Published bimonthly by

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pakistan J. Sci. Ind., Res. Vol. 22, Nos. 1-2, February-April 1978

SYNTHESIS AND REACTIONS OF 3-CINNAMOYL PYRIDONES AND AMINONICOTINONITRILES

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(Received April 5, 1977; revised July 1, 1978)

Abstract. As regards study of some of the reactions of 3-cinnamoyl pyridones (II), they were allowed to react with hydrazine hydrate, hydroxylamine hydrochloride, semicarbazide hydrochloride, phenylhydrazine, urea, thiourea, ethyl acetoacetate, ethyl malonate, and acetyl acetone, maleic anhydride, *N*-phenyl and *N*-*p*-tolylmaleimide. 2-Amino -4, 6-diaryl nicotinitriles (XIa, c and e) on hydrolysis with alcoholic potash gave (XIIa-c). (XIIa-c) were hydrolyzed with KOH in glycerol to (XIIIa-c). (XIIIa-c) on heating with acetic anhydride gave (XIV a-c) which on condensation with anisaldehyde gave (XVa-c). Treatment of (XIVa) with butylamine gave (IV).

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A FACILE ONE-STEP SYNTHESIS OF 2-SKATYL BENZIMIDAZOLE AND ITS REACTIONS WITH GRAMINE AND N,N-DIMETHYL AMINOPROPIOPHENONE HYDROCHLORIDE

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(Received June 26, 1978; revised July 31, 1978)

Abstract. A simple one-step synthesis of 2-skatyl-benzimidazole (I) is described. Reaction of (I) with gramine afforded 1,2 diskatyl benzimidazole (II) while treatment of (I) with N,N-dimethyl amino-propioiphenone hydrochloride furnished 1-(β -benzoyl ethyl)-2-skatyl benzimidazole (III). Compounds (II) and (III) have not been described previously.

THE INFLUENCE OF WATER VAPOUR ON THE CONVERSION OF α - TO γ -Fe₂O₃

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and

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Abstract. An attempt has been made to study the significance of water vapour in the conversion of α -Fe₂O₃ (hematite) to pure phase γ -Fe₂O₃ (maghemite or γ -hematite) which represents the information carrier for magnetic tape recording. A gas mixture of 10 v/o carbon monoxide and 90 v/o nitrogen instead of conventional hydrogen/nitrogen gas mixture was used as a reducing agent for α -Fe₂O₃ to Fe₃O₄ (magnetite). Subsequently Fe₃O₄ was oxidized by dry air to produce γ -Fe₂O₃. Air oxidation of freshly reduced active magnetite forms pure phase γ -Fe₂O₃ while that of altered magnetite (which was exposed to atmospheric conditions and has developed α -Fe₂O₃ nuclei on its surface) results in the formation of a mixture of α - and γ -Fe₂O₃. In the presence of water forming reducing gases, γ -Fe₂O₃ was obtained at switching temperatures (*i.e.* changing over from reducing to oxidizing atmosphere) of 190-280°, whereas in the absence of water a smaller temperature range of 240-80° was found. The results suggest that the presence of water vapour is not a necessary condition in the production of γ -Fe₂O₃.

THE THEORY OF EXCITONS IN ANISOTROPIC SEMICONDUCTORS

MOHAMMAD ALI KHATTAK,

Department of Physics, University of Peshawar, Peshawar

(Received August 10, 1977)

Abstract. The Effective Mass Theory (EMT) for isotropic crystals is briefly reviewed. Its shortcomings are pointed out. Reference is then made to our earlier work on the extension of this theory : Solving the effective wave equation (EWE) with the effective Hamiltonian expanded to ∇^4 and the static dielectric constant replaced by a dielectric function which depends on the electron-hole separation. A similar approach is now adopted for anisotropic crystals. An Effective Wave Equation (EWE) is developed and solved for a model semiconductor. The model chosen is very simple : a uniaxial semiconductor having an anisotropic band structure such that the anisotropy in the crystal structure and the band structure are small enough to be considered as perturbations on an overall isotropic semiconductor. The theory developed is then applied to the exciton spectrum of CdS. The relative magnitudes of the anisotropy and the dielectric corrections are calculated. The theoretical results are compared with the experimental observations.

ON A CLASS OF QUASIEQUILIBRATED FINITE DYNAMIC DEFORMATIONS OF SOLID CIRCULAR CYLINDERS

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(Received May 25, 1976 : revised March 29, 1977)

Abstract. Governing equations for finite dynamic response of a special class of quasiequibrated motion of solid rubber circular cylinders are obtained.

An explicit relation between the radial time dependent displacement and the axial time dependent stretch is obtained. It is shown that the distribution of radial and axial stresses are parabolic with respect to the radial and axial material coordinates, respectively. An analysis of the motion in the phase-plane is given to prove that the motion is periodic. Exact solution for the period of oscillations is obtained in case the oscillations are free, but initiated with a large initial information, and when the axial loading is of the Heaviside step loading type. It is also shown that due to the Poynting and Kelvin effects of finite shear additional surface tractions must be maintained on the surfaces of the cylinder in order to provide the class of nonhomogeneous quasiequibrated large dynamic deformations under discussion.

SPECTROPHOTOMETRIC INVESTIGATION OF THE ACID-BASE PROPERTIES OF SOME 8-HYDROXYQUINOLINE-5-SULPHONIC ACID DERIVATIVES

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(Received July 8, 1978; revised August 21, 1978)

Abstract. The absorption spectra of some 8-hydroxyquinoline-5-sulphonic acids are investigated in buffer solutions of varying pH values. The spectral shifts are explained on the basis of the existence of two acid-base equilibria involving the protonation of the quinoline nitrogen and the dissociation of a proton from the phenolic group. The pK_a values are determined from the spectral changes with pH and commented upon in terms of molecular structure.

THERMODYNAMIC STABILITY CONSTANTS AND OTHER RELATED THERMODYNAMIC PROPERTIES FOR Zn (II)-PMBP COMPLEX

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(Received June 10, 1978)

Abstract. The thermodynamic stability constants and other related thermodynamic properties for the complex formed between Zn (II) and 1-phenyl-3-methyl-4-benzoyl-pyrazolone-5 have been determined over the temperature range, 5-45° in chloroform phase.

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SYNTHESIS OF METHYL-2-ACETYL-3-HYDROXY-5, 6-DIMETHOXYBENZOATE

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(Received May 27, 1978 ; revised June 21, 1978)

crystallization from petroleum gave methyl 2-acetyl-3-hydroxy-5, 6-dimethoxybenzoate (430 mg.) m.p. 79°. (Found C, 57.0 ; H, 5.6 ; $C_{12}H_{14}O_6$ requires C, 56.6, H, 5.5%). ν_{max} 1722 and 1615 cm^{-1} . Nmr signals at τ 7.55 (3H, S), 6.21 (3H, S) 6.8 (3H, S), 6.05 (3H, S) 3.48 (1H, S), 2.8 (1H, S) m/e (mas spectrum) = 254.

References

1. F. M. Dean, D. R. Randall and G. Winfield, J. Chem. Soc., 1071 (1959).

Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 23, Nos. 1-2, February-April, 1979

ASPECTS OF LARVAL MORPHOLOGY AND LARVAL AND ADULT KEYS TO THE RICE STEM BORERS (INSECTA : LEPIDOPTERA) AND A NEW RECORD OF A RICE STEM BORER NIPHADOSES GILVIBERBIS (ZELL.) FROM PAKISTAN*

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(Received May 31, 1978)

Abstract. Aspects of larval morphology with reference to chaetotaxy of rice stem borer species of lower Sind, Pakistan, are investigated and keys to the larvae and adults are formulated to help identify these devastating insects. A new record of a rice stem borer species *Niphadoses gilviberbis* (Zell.) from lower Sind, Pakistan, is also presented.

VARIATIONS IN ALLOMETERIC GROWTH IN THE SHELLS OF *CRASSOSTREA RIVULARIS* (GOULD), *SACCOSTREA GLOMERATA* (GOULD) AND *S. CUCCULLATA* (BORN) FROM THE COAST OF KARACHI

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(Received February 15, 1978; revised September 12, 1978)

Abstract. The dimensional relationship of the shells of the oysters, *Crassostrea rivularis*, *Saccostrea glomerata*, and *S. cucullata*, occurring at the coast of Karachi, have been investigated. *C. rivularis* attains greater shell dimensions than the other two species. *S. cucullata* requires greater width and thickness of shell than *S. glomerata*. In *C. rivularis* the shells of its Sonari population are greater in dimension and thickness than those of the Korangi Creek population, and there is also a differential orientation in the two populations. In all the five populations of the three species the length/height relationship has always been curvilinear and that of the width/height linear. The indices of shape show that there is a great variation in the shells of the wild and exploited populations of these species. The difference in the pattern of growth of the shells of these populations seems to be influenced by ecological factors like the density of population, surf action, and exposure trait.

TOXIC METABOLITES PRODUCED BY *ASPERGILLUS EGYPTIACUS*

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(Received March 4, 1978; revised May 18, 1978)

Abstract. The toxicity of a crude chloroform extract of *A. egyptiacus*, partially purified on silica gel column, was examined by intraperitoneal injection of sublethal dose to mice. Respiration slowed down and became mainly thoracic. After dissection widespread hemorrhages of the lung were observed. Histological examination of the lung showed the congestion, dilatation of the alveoli and inflammation of the pleural membrane. The liver, when stained with H & E, showed a dark area, mostly around the central veins, where the cytoplasm was mostly acidophilic. The hepatic cells stained with PAS revealed no reserved carbohydrate material. Activity of the toxin against the growth of some microorganisms (bacteria and fungi) was examined.

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Pakistan J. Sci. Ind. Res., Vol. 23, Nos. 1-2, Feb.-April, 1979

**CELLULOSE DECOMPOSING FUNGI OF
PAKISTAN**

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(Received January 29, 1978 ; revised May 16, 1978)

S. No.	Name of the Fungus	Reference No.
15.	<i>Chepalosporium</i> spp.	38
16.	<i>Cephalothecium roseum</i> Corda	23
17.	<i>Chaetomium atrobruneum</i> Ames	18
18.	<i>Chaetomium aureum</i> Chivers	34
19.	<i>Chaetomium funiculum</i> Cooke	19
20.	<i>Chaetomium globosum</i> Kunze	19

Technology Section

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THE EXTENT AND SEVERITY OF Zn AND Cu DEFICIENCY AND THEIR MUTUAL INTERACTION IN MAIZE ON SOILS OF THE PUNJAB

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Soil Science Division, Nuclear Institute for Agriculture and Biology, Faisalabad.

(Received April 3, 1978, received May 27, 1978)

Abstract. The effect of Zn and Cu fertilizers on yield and their uptake by maize was studied in a pot experiment on 23 calcareous soils collected from major maize growing tracts of the Punjab. Ten ppm Zn applications increased dry matter yields quite appreciably, while 10 ppm Cu decrease it on most of the soils. Zinc uptake by plants rose on Zn treated soils. Its applications generally depressed Cu concentration in plants without exhibiting any adverse effect on plant growth. Copper application enhanced Cu uptake but aggravated Zn deficiency in plants resulting in marked reductions in dry matter yield on many soils.

Zinc fertilization depressed P concentration in plants on most of the soils. The response of maize to Zn addition was found to have little relevance to P/Zn ratio of maize tissue.

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THE FATE OF SOIL-APPLIED ZINC AND THE EFFECT OF SELECTED SOIL PROPERTIES ON ZINC AVAILABILITY IN ALKALINE CALCAREOUS SOILS

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Soil Science Division, Nuclear Institute for Agriculture and Biology, Faisalabad

(Received April 4, 1978 ; revised August 21, 1978)

Abstract. In a soil incubation study on twenty-two alkaline calcareous soils, it was found that the fixation of Zn proceeded rapidly up to 3 days of contact but thereafter it increased gradually and reached a slow steady state after 7 days. Average recovery of added Zn with DTPA (diethylenetriaminepentaacetic acid) after 14 days was about 63%. This fraction presumably would be available for plant uptake.

DTPA-extractable native Zn showed a significant correlation with clay and organic matter content of the soils. Native soil Mn extracted with DTPA, and NaHCO_3 -extractable P correlated negatively ($P < 0.05$ and $P < 0.01$ respectively) with Zn fixed after 14 days' incubation.

CHANGES IN DTPA-EXTRACTABLE Zn, Cu, Fe AND Mn IN TWO ALKALINE CALCAREOUS SOILS FOLLOWING N FERTILIZATION

F. HUSSAIN and A. RASHID,

Soil Science Division, Nuclear Institute for Agriculture and Biology, Faisalabad

(Received February 28, 1978; revised July 25, 1978)

Abstract. Changes in DTPA-extractable zinc, copper, iron, and manganese in two alkaline calcarous soils following fertilization from Thikriwala and Kamalia in the Faisalabad district were studied. The results of the present study reveal that the effect of acidifying N fertilizers on micronutrient status may not always be favourable as substantial decrease in Zn and Mn solubilities was recorded with N application to these alkaline calcareous soils. DTPA-extractable micronutrients as influenced by various levels of urea and zinc in two soils incubated for 13 days at $30 \pm 1^\circ$ and 17% field capacity was also studied.

EFFECT OF Mg APPLICATION ON Zn UPTAKE BY MAIZE AND ON ITS (Zn) AVAILABILITY IN ALKALINE CALCAREOUS SOILS

F. HUSSAIN, RAHMATULLAH* and A. RASHID

Soil Science Division, Nuclear Institute for Agriculture and Biology, Faisalabad

(Received May 15, 1978; revised July 26, 1978)

Abstract. A pot culture experiment with different Mg and Zn levels indicated Mg to have little effect on Zn availability to maize (*Zea mays* L., cv. BS-I) grown on an alkaline calcareous soil. A soil incubation study with different Mg and Zn levels applied to two alkaline calcareous soils supported the results of the pot culture experiment. Zinc additions were found to enhance the dry matter yield of maize plants appreciably. The present study was indicative of the probable existence of Mg deficiency in light textured soils as Mg increments increased the dry matter yield of maize plants significantly.

Pakistan J. Sci. Ind. Res., Vol. 23, Nos. 1-2, February-April, 1979

LEAF PROTEIN CONCENTRATE IN HUMAN DIET : Part II

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PCSIR Laboratories, Lahore-16

(Received April 1, 1978; revised September 12, 1978)

Abstract. Leaf Protein Concentrate was incorporated into ten common Pakistani dishes including two varieties of the Peanut "maroonda". The dishes were evaluated organoleptically and analyzed for ptorein, lipid and fibre contents. Protein contents of these dishes increased up to 70.2% on fortification with Leaf Protein Concentrate (LPC). All these dishes were found acceptable.

STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part XX. *Pimpinella acuminata* (Edgew) Clarke (Jungli Anise) Seed Oil

MUHAMMAD ASHRAF, RAFI AHMAD, BUSHRA ASGHAR and MOHAMMAD KHURSHID BHATTY,

PCSIR Laboratories, Lahore-16

(Received May 18, 1978)

Abstract. The essential oil of the *Pimpinella acuminata* seed with an yield of 0.08% has been investigated with respect to its physico-chemical characteristics and chemical composition. The composition of the oil by GLC has been shown as : pyrrole (1.3%), coniine (4.0%), methyl coniine (70.0%), unknown nitrogenous compounds (4.5%), 1-methyl-2-butyl piperidine (0.9%), 1-methyl-2-pentyl piperidine (3.3%), carvone (0.8%), high boiling hydrocarbons (7.9%), apirole (1.5%), *n*-pentadecane (4.0%), *n*-hexadecane (0.6%), heptadecane (3.0%), unidentified oxy-compounds (2.2%), eugenone (0.4%) and *iso*-pimpinellin (0.6%). The essential oil is chiefly composed of *n*-methyl coniine, one of the alkaloids of *Conium maculatum*,¹ the poison hemlock.

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STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part XXI. *Oenanthe javanica*, DE (Surkhai) Seed Oil

MUHAMMAD ASHRAF, JAVED AZIZ, SHAHID MAHMOOD and MUHAMMAD KHURSHID BHATTY,

PCSIR Laboratories, Lahore-16

(Received May 18, 1978)

Abstract. The essential oil of the seed of the Pakistani *Oenanthe javanica*, obtained in a 3.5% yield, has been examined for its physico-chemical characteristics and chemical composition for the first time. It contains α -pinene (0.79%), β -pinene (15.96%), myrcene (1.58%), limonene (61.88%), γ -terpinene (11.01%), an unidentified monoterpene (4.52%), myristicin (0.03%), carvone (1.23%), linalool (0.97%), and a mixture of unidentified hydroxy compounds (0.20%). The oil predominantly consists of hydrocarbons of which limonene is the major component.

STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE.

Part XXII. *Ferula foetida* Regel (Ushi) Seed Oil

MUHAMMAD ASHRAF and MUHAMMAD KHURSHID BHATTY,

PCSIR Laboratories, Lahore-16

(Received May 18, 1978)

Abstract. The essential oil from the fresh mature seed of the *Ferula foetida* Regel, grown in Pakistan, has been examined with respect to its physico-chemical characteristics and chemical composition. The percentage composition of the oil as determined by column chromatography coupled with gas-liquid chromatography of the hydrocarbons and physico-chemical investigation of the oxygenated components is reported. Its final composition, as determined by this method as well as from the time and temperature programmed GLC/MS studies of the alcoholic fraction is: α -pinene (2.36, 1.69%), camphene (1.04, 0.90%), myrcene (2.50, 2.00%), limonene (0.60, 0.72%), unknown sesquiterpene (1.00, 0.72%), longifolene (5.90, 4.60%), cadinene (0.90, 0.30%), β -caryophyllene (5.00, 3.80%), β -selinene (17.20, 15.20%), unknown sesquiterpene (1.40, 1.00%), bornyl acetate, (2.25, 4.50%), fenchone (1.50, 2.40%), eugenol (5.00, 4.68%), linalool (0.06, 0.05%), geraniol (0.05, 0.08%), isoborneol (0.0, 0.4%), borneol (0.15, 0%), guaiaol (0.9, 57%), cadinol (0.17, 90%), farnesol (0.13, 07%), mixture of sesquiterpenic alcohols (39.32, 0%) and a mixture of coumarins (7.50, 7.80%). The presence of sulphur bearing compounds was not detected in the oil.

STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part XXIII. *Ferula narthex* Boiss (Rao) Seed Oil

MUHAMMAD ASHRAF, SAJJAD ASGHAR ZAIDI* and MUHAMMAD KHURSHID BHATTY,

PCSIR Laboratories, Lahore-16

(Received September 4, 1978)

Abstract. The essential oil of the *Ferula narthex* distilled from the fresh mature seed of Pakistani origin in 1.1% yield has been characterized for the first time with respect to its physico-chemical properties and chemical composition. The oil contains α -pinene (7.32%), Δ^3 -carene (20.43%), camphene (1.81%), limonene (9.20%), γ -terpinene (2.78%), *p*-cymene (1.02%), geranyl acetate (7.20%), α -terpineol (16.24%), an unidentified acid (2.65%) and a mixture of coumarins with tarry matter (12.97%). No sulphur bearing compound was detected in the essential oil.

STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part XXIV. *Ferula costata* (Ghuttai) Seed Oil

MUHAMMAD ASHRAF, JAVED AZIZ, SHAHID MAHMOOD and MOHAMMAD KHURSHID BHATTY,

PCSIR Laboratories, Lahore-16

(Received September 4, 1978)

Abstract. The essential oil from the fresh seed of the *Ferula costata*, growing wild in Pakistan, has been characterized and studied with respect to its physico-chemical properties and chemical composition. The percentage composition of the oil as determined by time and temperature programmed GLC has been found to contain α -pinene (0.85%), β -pinene (0.73%), myrcene (0.25%), limonene (0.33%), δ -cadinene (1.50%), γ -cadinene (1.00%), isolongifolene (0.84%), β -elemene (1.15%), β -caryophyllene (11.70%), humulene (5.26%), unknown sesquiterpenes (8.29%), ledol (1.84%), unknown alcohol (1.66%), guaial (1.15%), torryol (7.15%), elemol (2.20%), cedrol (5.80%), cadinol (7.40%), δ -cadinol (10.70%) and farnesol (30.20%). In spite of the best efforts, no sulphur bearing compound has been detected in the essential oil of this *Ferula* species.

STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part XXV *Platytaenia multicaule* (Karpula) Oil of the Whole Plant

MUHAMMAD ASHRAF, BUSHRA ASGHAR SAJJAD ASGHAR ZAIDI* AND MUHAMMAD KHURSHID BHATTY

PCSIR Laboratories, Lahore-16

(Received September 4, 1978)

Abstract. Physico-chemical investigations on the essential oil of the *Platytaenia multicaule* whole plant are reported for the first time. The percentage composition of the oil, with 0.52% yield, has been shown to contain santene (1.50%), α -thujene (0.85%), α -pinene (0.70%), camphene (7.45%), phellandrene (19.10%), linalyl acetate (4.40%), *dl*-piperitone (3.32%), linalool (7.60%), α -terpineol (24.15%), a mixture of hydroxy compounds (8.30%) and a mixture of coumarins with tarry material (18.20%).

The chemical composition of the oil suggests that the essential oil of the species can find application in perfumery and pharmaceutical preparations.

FATTY ACID COMPOSITION OF THE OIL OF SUNFLOWER SEEDS CULTIVATED IN PAKISTAN

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(Received February, 23 ; revised March 27, 1979)

Abstract. Experimental cultivation of the "Peredovik" variety of sunflower has been started in Pakistan. The fatty acid composition of the oil obtained from the kernel of these cultivated sunflower seeds as determined by GLC is myristic (1.5%), palmitic (11.5%), stearic (traces), oleic (55.0%) and linoleic (32.0%) acids.

STUDIES ON THE GROWTH RATES OF POLYETHYLENE SINGLE CRYSTALS

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(Received June 18, 1978)

Abstract. A study has been made on the growth rates of intermediate molecular weight fractions of linear polyethylene as a function of solution concentration, molecular weight and crystallization temperature. In agreement with earlier work, the growth rate was found to be proportional to the concentration raised to a power less than unity and the magnitude of the concentration exponent at a given crystallization temperature decreases as the molecular weight increases. Furthermore, at a given molecular weight the exponent tends to increase as the crystallization temperature increases. These results agree qualitatively with the predictions of Sanchez and DiMarzio. These observations could be satisfactorily accounted for when considering the mechanism of the folded deposition of the chains, and in particular the situation, unique for polymers, that a given chain can be partly attached to the crystals while parts of it remains in solution, i.e. forming cilia.

EFFECT OF REPLACING SUCROSE BY DIFFERENT PROPORTIONS OF LIQUID AND POWDER GLUCOSE IN THE COVER SYRUP ON THE QUALITY OF CANNED MANGO SLICES

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(Received July 14, 1976; revised June 6, 1978)

Abstract. "Langra" mango slices were canned in 30°Brix syrup containing 100% sucrose, 100%, maize "gur" white (powder glucose), 100% liquid glucose as well as the replacement of sucrose by maize "gur" white and glucose in different proportions. The effect of such replacements upon the quality of canned slices was studied during 180 days' storage at room temperature. Throughout the storage period there was a slight increase in the drained weight of canned slices under all treatments. Storage also caused an appreciable increase in total soluble solids and Brix/acid ratio in slices. During storage there was a considerable decrease in ascorbic acid. On the basis of organoleptic evaluation after 180 days of storage, it was observed that the replacement of sucrose by 25% liquid glucose or 25% maize "gur" white had a beneficial effect on the colour, taste, texture, and flavour of the canned mango slices.

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MANGANESE DIOXIDE AS A DEPOLARIZER IN THE DRY BATTERY (A REVIEW)

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(Received November 17, 1977 ; revised September 12, 1978)

Abstract. Since its production EMD (electrolytic manganese dioxide) has been used in the formulation in partial substitution for natural ore at the many dry-battery producing industries.

This paper reviews the role of manganese dioxide as a depolarizer in the common dry battery and gives information on dry batteries.

CHEMICAL EXAMINATION OF THE ESSENTIAL OIL OF LANTANA CAMARA

SHAHID MAHMUD, A. SATTAR and S. A. KHAN

PCSIR Laboratories, Lahore.-16

Abstract. The essential oil of the flowers of *Lantana camara* on chemical examination was found to contain α -pinene (2.9%), β -pinene (1.7%), camphene (1.2%), limonene (1.4%), *p*-cymene (2.1%), caryophyllene (19.8%), salinene (13.8%), 1,8-cineol (10.4%), camphor (2.1%), geranyl acetate (4.9%), bis-(2-ethyl butyl) phthalate (16.0%) and an unidentified ester (12.1%). The yield of the oil was 0.15%.

IODINE INITIATED POLYMERIZATION OF VINYL MONOMERS

(A Review of the Field, 1866-1977)

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PCSIR Laboratories, Lahore - 16

and

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Abstract. A review of iodine initiated polymerization is presented here in order to outline the many different ideas which have been published about the kinetics and mechanism of these reactions.

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ON THE ROLE OF SOIL MEDIUM IN P-INDUCED Zn DEFICIENCY IN PLANTS

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(Received March 9, 1978; revised June 25, 1978)

(data not shown). At the end of the incubation period, the soils were extracted with 0.005M DTPA (diethylenetriaminepentaacetic acid) and Zn concentration in the soil extracts was determined by atomic absorption spectrophotometry.¹⁵

Data were subjected to analysis of variance and the difference between different means was evaluated by the least significant difference test.

Results and Discussion

Irrespective of the P levels, DTPA-extractable Zn of both soils progressively increased with an increase in Zn rate ($P < 0.01$, Table 1). On the light

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Pakistan J. Sci. Ind. Res., Vol. 23, Nos. 1-2, Feb.-April, 1979

INFLUENCE OF ADDING GYPSUM ON DTPA-EXTRACTABLE ZINC, COPPER, IRON AND MANGANESE IN TWO UPLAND SOILS

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(Received February 1, 1978; revised August 1, 1978)

portions of air-dried and 2-mm-sieved soil samples of these pretreated soils were taken in flat-bottomed plastic vessels. Samples in triplicate were superimposed with 4 rates of Zn (0, 2.5, 5.0 and 10.0 ppm) as $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ solution and the amount of water in the soil of each vessel was brought to its 75% field capacity. Soils were incubated at $30 \pm 1^\circ$ for 13 days, a period found sufficient for the maximum fixation of Zn (data not shown). Moisture level of the soils was maintained at 75% field capacity during the experimental period. After a 13-day incubation, the soil samples were extracted with 0.005 M DTPA (diethylenetriaminopentaacetic acid) and Zn, Cu, Fe and Mn in the soil extracts were determined by atomic absorption spectrophotometry.⁸