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Physical Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 20, Nos. 4-5, August-October 1977

CHROMATOGRAPHY OF PHOSPHATE ESTERS

Part I. Separation by Paper Chromatography

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(Received April 13, 1976; revised February 7, 1977)

Abstract. Phosphate diesters have been separated by paper chromatography on Whatman paper No. 1 by means of *n*-butanol : 4% boric acid (86 : 14) as an irrigation solvent system, at 25°. R_f values of the esters in pure form as well as in mixtures have been reported.

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SOME REACTIONS WITH 4-ARYLIDENE DERIVATIVES OF 5(4)-OXAZOLONE AND 5-IMIDAZOLONE

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Chemistry Department, Ain Shams University, Abbassia, Cairo, Arab Republic of Egypt

(Received December 21, 1976)

Abstract. 4-Arylidene-2-phenyl-5(4)-oxazolones (I*a-e*) react with (*o-*, *m-*, *and p-*) aminobenzoic acids to give arylidene-hippuric carboxyanilides (II*a-k*). 4-Arylidene-1-hydroxy-2-(2′-furyl)-5-imidazolones (IV*a-d*) react with acid chlorides to give 4-arylidene-1-aroyloxy-2-(2′-furyl)-5-imidazolones (V*a-h*). Also the reaction of (IV*b-e*) yield (VI*a-e*) was discovered.

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DIPOLAR ADDITION REACTIONS ON ALDAZINES AND ANILS

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(Received February 29, 1976; revised February 1, 1977)

Abstract. Aldazines (Ia, b) add aromatic hydrocarbons in the presence of anhydrous $AlCl_3$ to give (II), (III) and (IV). The cyclo dipolar addition of ethyl cyanoacetate, ethyl bromoacetate, and thioglycolic acid on anils was used as a useful method for synthesis of some large and small ring heterocycli s (VI), (VII), (X) and (XIV).

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MICRODETERMINATION OF GLUTATHIONE, THIOGLYCOLIC ACID AND ISONICOTINIC ACID HYDRAZIDE

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(Received May 10, 1977 ; revised July 19, 1977).

In our previous communications we have used **N**-bromosuccinimide for various selective as well as general oxidations.[1-9] The same compound was also used for certain determinations based on the addition of positive bromine or displaced iodine to organic compounds.[10-13]

(*iv*) *Isonicotinic acid hydrazide*. (98% *B. D. H. Product*). Exactly 300.0 mg of analytical grade reagent were dissolved in distilled water and diluted to 100 ml.

(*v*) *Bordeaux Red*, 0.05% *solution in water*. All the other reagents used were of analytical grade

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MOLECULAR WEIGHT DETERMINATION OF POLYETHYLENE BY LIGHT SCATTERING TECHNIQUES

NOOR AHMAD and SABZ ALI

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(Received May 14, 1975; revised April, 18, 1977)

Abstract. The molecular weight determination of polyethylene crystals was carried out by the Zimm Plot method. These crystale were prepared from Marlex 6050 in dilute solutions using *p*-xylene as a solvent and the temperature range at 75-92°. The average molecular weights obtained at 436 mμ are 5.6×10^6 and 12.5×10^6 while at 546 mμ the average molecular weights are 5.8×10^6 and 12.6×10^6 at annealing temperatures of 75° and 92° respectively. An effort is made to compare these light scattering results with those obtained from electron micrographs. Also the values of molecular weights and particles sizes are given in the respective tables for both of these methods.

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CHROMONE 6-BENZOYLHYDRAZONE COMPLEXES OF SOME TRANSITION METALS

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(Received May 6, 1977 ; revised June 4, 1977)

Abstract. Metal complexes of 2-methyl 5-methoxy 7-hydroxy chromone 6-benzoylhydrazone with some divalent transition metal ions were investigated by the use of spectrophotometric, electric conductance, pH titration and ir measurements. Isolation of solid complexes and physical measurements revealed the existence of mono- and *bis*-ligand complexes. Complex formation is shown to take place through a proton displacement from the hydroxyl group in she 7-position of the chromone residue of the ligand. Thee azomethine and carbonyl groups of chromone and benzoyl hydrazide residues are also involved in coordination.

Short Communications

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VOLUMETRIC DETERMINATION OF PLATINUM WITH COBALT (III) ACETATE

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(Received October 20, 1975; revised January 24, 1977)

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HEXAMINECOBALT (III) TRICARBONATOCOBALTATE (III) AS REDOX TITRANT FOR THE DETERMINATION OF TITANIUM

MUHAMMAD HANIF, MAHMOOD AHMAD, MUHAMMAD SARWAR CHAUDHRY and ZAFARULLAH SHEIKH*

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(Received January 13, 1977 : revised July 17, 1977).

Biological Sciences Section

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PLAGIOPORUS HETERORCHIS SP.N. (TREMATODA : OPECOELIDAE) FROM THE FISH POMADASYS OLIVACEUM (DAY) OF KAKACHI COAST

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(Received December 5, 1975; revised February 19, 1977).

Abstract. A new trematode, *Plagioporus heterorchis* sp.n., is described from the fish *Pomadasys olivaceum* (Day) of Karachi coast. This species is characterized by possessing a very small fore body; indistinct esophagus; cirrus sac extending slightly posterior to acetabulum; genital pore at the base of pharynx; testis showing great morphological variation; vitellaria follicular extending laterally, except posterior to testis, from the base of pharynx to posterior end of the body; eggs 0.041-0.076 mm by 0.03-0.04 mm and excretory vesicle extending to the base of posterior testis.

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SIMPLE OVIPOSITION APPARATII AND OVIPOSITION RATE OF *PECTINOPHORA GOSSYPIELLA* (SAUNDERS) EMERGED FROM FIELD COLLECTED LARVAE AND THOSE REARED ON ARTIFICIAL DIETS. LEPIDOPTERA : GELICHIDAE

M. Rafi Shaikh, Khalique Ahmed, Mrs. Feeroza Khalique and Syed Firasat Ali Zaidi,
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(Received July 10, 1976)

Abstract. Detailed description of procedures used in oviposition of *P. gossypiella* (Saunders) during mass rearing is presented. Data presented indicate oviposition results with respect to different number of adults released in cages, total number of eggs per cage, eggs laid by single female, preoviposition period, duration of oviposition experiments, duration of maximum oviposirion period, temperature, and humidity range.

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SEASONAL VARIATION IN CHEMICAL COMPOSITION OF *PADINA PAVONIA*

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and

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(Received February 2, 1977; revised April 29, 1977)

Abstract. An investigation of the effect of seasonal variation on the chemical composition of the brown algal species, *Padina pavonia*, showed that the fluctuations of protein and amino acid content of total lipids and mannitol were noted in August and November, respectively. The presence of the free monosaccharides, glucose, xylose, glucuronic acid, and mannose was observed in November. In the other seasons, when mannose was absent, there were only traces of the first three sugars. Acid hydrolysis of the seaweed afforded mannuronic acid, guluronic acid, glucuronic acid and their respective lactones as well as galactose, glucose, mannose, xylose, and fucose. The proportions of these sugars in the algal material differed according to the collection season.

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MARINE FISH NEMATODES OF PAKISTAN

Part VIII. Goezia pakistanica sp. n. (Heterocheilidae) from Parastromateusniger (B1) of Karachi coast

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(Received December 23, 1975 ; revised July 10, 1977)

Abstract. *Goezia pakistanica* (Heterocheilidae) is described from the fish *Parastromateus niger* (B1) from West Wharf, Karachi. It is the largest among the known species of the genus and is characterized by having a typical ventriculus with a spiny valvular apparatus, tail provided with a series of circlets of backwardly directed spines, large outwardly expanded lips with well developed interlabia and two pairs of proximal oral papillae, spicules relatively large, alated and subequal, a small gubernaculum like chitinous structure, 37 pairs of pedunculate caudal papillae including 6 pairs post-anal, one-pair adanal and 30 pairs preanal. In the female the vulva is simple; the eggs are large, subglobular, and thin-shelled. From other species of the genus the new species is distinguishable mainly in having a larger body size, different sizes of spicules, eggs and different number of caudal papillae.

Short Communications

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POPULATION FLUCTUATION OF *ZYGINIDIA QUYUMI* (AHMED) ON WHEAT IN PUNJAB-PAKISTAN*

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(Received March 18, 1976; revised January 4, 1977)

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FIELD ASSESSMENT OF LOSSES IN THE YIELD OF WHEAT RESULTING FROM INSECT PESTS IN PAKISTAN *

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(Received December 27, 1975 ; revised November 17, 1976)

Contrary to the general impression that wheat in Pakistan remains safe from serious attack of insects, Ahmed and Jabbar (1972), and Yunus and Moosa (1971) observed that a leaf-hopper, *Zyginidia quyumi* becomes quite a serious pest of the crop in some parts of Pakistan. Yunus and Akram (1971) worked on the chemical control of the species in

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STEROL COMPOSITION OF GUAR SEED OIL

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(Received December 2, 1975; revised February 19, 1977)

Abstract. GLC was used to determine sterol composition of guar meal oil. Identification of campesterol, stigmasterol, sitosterol and avenasterol was carried out by means of GLC and combined GLC-MS. The presence of cholesterol, brassicasterol, Δ^7-avenasterol and stigmast-7-enol in traces (less than 1%) was demonstrated on the basis of GLC evidence.

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STUDIES ON PIGMENTS AND VITAMIN E AT DIFFERENT STAGES OF GROWTH OF SOME LEGUMINOSAE PLANTS

NAWAB KHAN and MANZOOR ELAHI

PCSIR Laboratories, Lahore-16

(Received January 17, 1977; revised March 16, 1977)

Abstract. Carotenoid and chlorophyll contents of some leguminous plants have been determined at various stages of growth with the view to finding out the right stages for the commercial production of these pigments. Trial A with cutting period of 20 days may be preferred over trial B with the cutting period of 40 days for this purpose. Suggestion has been made for the complete utilization of the right leguminous plant for the production of carotenoids, chlorophylls and proteins which are devoid of any colour and flavour. The vitamin E content at various stages of growth was also determined.

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EFFECT OF GAMMA (Co^{60}) RADIATION ON THE GROWTH AND ALKALOIDAL CONTENTS OF MEDICINAL PLANTS

Part II. Papaver Somniferum L. (Papaveraceae)

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Drug Research Division, PCSIR Laboratories, Peshawar.

(Received September 23, 1975)

Abstract. The paper studies the effect of gamma cobalt-60 radiation on the growth and alkaloidal contents of medicinal plants. It was found that, when opium poppy seeds are irradiated with gamma cobalt at the 4 Krad dose, planted, and the opium is collected thereform, the percentage of morphine recorded an increase up to 29.17%.

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ANTIMICROBIAL PROPERTIES OF HIGHER PLANTS OF KARACHI REGION

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(Received November 5, 1975; revised April 7, 1977)

Abstract. The antibacterial properties of ethanolic extracts of various parts of 27 wild and cultivated higher plants of Karachi region have been studied *in vitro*. Ethanol extracts of six plants showed, through radial diffusion assay technique, activity against 16-22 test organisms which included 13 pathogenic bacteria and 10 dermatophytic fungi. The antifungal activity has been compared with that of a known pharmaceutical product. Use of the extracts of the plants which showed promising results, in dermatophytic conditions, are discussed.

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

Part XI. Pimpinella stewartii ("Dirphuki") oil of the mature and the immature seed and stem.

MUHAMMAD ASHRAF, JAVED AZIZ and MUHAMMAD KHURSHID BHATTY
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(Received February 19, 1977; revised April 4, 1977)

Abstract. The essential oil of the seed and the stem of *Pimpinella stewartii* which grows wild in Pakistan has been studied for the first time with respect to its physico-chemical characteristics and chemical composition. The oil obtained from its mature seed, premature seed and stem in 1.7, 2.0 and 1.0% yields is composed of α-pinene (4.34, 6.70, 2.85%), myrcene (17.96, 5.10, 11.40%), limonene (30.0, 21.3, 19.0%), γ-terpinene (13.16, 2.53, 8.70%), *p*-cymene (9.45, 5.25, 8.70%), menthyl acetate (2.1, 1.2, 1.5%), geranyl acetate (5.15, 3.50, 5.30%), menthone (0.35, 1.0, 0%), osthole (11.20, 18.35, 2.50%), osthenole (3.38, 11.80, 13.26%), menthol (1.22, 2.80, 2.50%), α-terpineol (0.40, 6.1, 2.7%) and angelicin (0.5, 2.1, 1.2%) respectively. The oil recovered from the various parts of the species is qualitatively the same.

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

Part XII. Ligusticum thomsonii ("Dugzira") seed oil

MUHAMMAD ASHRAF, AMIRUDDIN and MUHAMMAD KHURSHID BHATTY

PCSIR Laboratories, Lahore-16

(Received February 19, 1977; revised April 4, 1977)

Abstract. The essential oil distilled from the seed of *Ligusticum thomsonii*, growing wild in Pakistan, has been physico-chemically characterized and studied for its chemical composition. It consists of thujene (0.31%), α-pinene (0.58%), camphene (0.74%), myrcene (1.77%), Δ^3-carene (1.46%), β-phellandrene (1.54%) limonene (2.15%), α-phellandrene (1.44%), γ-terpinene (1.18%), unidentified sesquiterpenes (1.93%), β-selinene (0.90%), linalyl acetate (0.89%), geranyl acetate (0.41%), α-terpineol (26.4%), mixture of terpineol and borneol (8.62%), coumarins (35.84%) and tarry material (4.66%).

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

Part XIII. Peucedanum ferulaefolium Gilli (Wild Dill) seed oil

MUHAMMAD ASHRAF, JAVED AZIZ, AMNA KARIM and MUHAMMAD KHURSHID BHATTY
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(Received February 19, 1977; revised April 4, 1977)

Abstract. The essential oil distilled from the seeds of *Peucedanum ferulaefolium* with a yield of 2.9% has been examined for the first time with respect to its physico-chemical properties and chemical composition. The oil has been shown to contain santene (30.6%), eugenol acetate (2.6%), methyl eugenol (50.0%), unidentified hydroxy compounds (6.6%) and coumarins (10.2%). The hydrocarbon fraction of the oil mainly consists of a single component santene.

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

Part XIV. Dorema ammoniacum ("Ushak") gum

MUHAMMAD ASHRAF, ARSHAD MUNIR, AMNA KARIM and MUHAMMAD KHURSHID BHATTY

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(Received February 19, 1977; revised April 4, 1977)

Abstract. The essential oil distilled from the gum of *Dorema ammoniacum*, with an yield 0.48% has been characterised physico-chemically and studied with respect to its chemical composition for the first time. The oil has been found to contain hydrocarbon fraction (28.0%) with ferulene being the major component (19.6%), while the oxygenated fraction is composed of linalyl acetate (1.2%), citronellyl acetate (38.6%), doremone and doremyl alcohol (4.2%), doremyl alcohol (12.7%) and coumarins (15.0%). The oil is similar to its kind produced elsewhere in the world.

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

Part XV. Prangos pabularia ("Mushain") seed oil

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(Received February 19, 1977; revised April 4, 1977)

Abstract. The essential oil of the *Prangos pabularia* seed, with an yield 0.2%, has been examined for the first time with respect to its physico-chemical characteristics and chemical composition. The percentage composition of the essential oil is α-pinene (4.4%), camphene (traces), β-pinene (0.2%), myrcene (7.5%), Δ^3-carene (1.7%), limonene (13.64%), γ-terpinene (8.73%), β-selinene (7.3%), β-caryophyllene (3.1%), anethole (1.5%), fenchone (0.73%), unidentified esters (2.27%), cuminaldehyde (0.89%), borneol (12.8%), cumic acid (0.67%) and coumarnis (21.0%). The water cohobation oil of the species is composed of α-pinene (2.1%), camphene (1.32%), β-pinene (0.1%), myrcene (3.90%), Δ^3-carene (0.42%), limonene (6.7%), γ-terpinene (4.3%), β-selinene (5.3%), β-caryophyllene (2.52%), anethole (0.8%), fenchone (2.38%), unidentified ester (0.25%), cuminaldehyde (3.2%), α-terpineol (2.53%), unidentified alcohol (5.75%), borneol (10.82%), cumic acid (4.3%) and coumarins (40.5%).

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

Part XVI : Angelica glauca Edgew ("Chora") seed oil

MUHAMMAD ASHRAF, RAFI AHMAD and MUHAMMAD KHURSHID BHATTY
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(Received February 19, 1977 ; revised April 4, 1977)

Abstract. The essential oil of the seed of *Angelica glauca* of Pakistan, has been studied with respect to its physico-chemical values and chemical composition for the first time. The percentage composition of the oil has been shown as : α-phellandrene (17.70%), terpinyl acetate (30.4%), osthole (19.15%), osthenole (12.63%), angelicin (2.07%) and a mixture of coumarins (13.07%). A marked qualitative and quantitative difference has been noticed in the chemical composition of the essential oil of the local species and that of the similar oils produced elsewhere in the world.

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FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS

Part V : Investigation on the Commercial Species of Rutaceae

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(Received September 23, 1975)

Abstract. Seed oils from the commercially grown varieties of the citrus fruit in Pakistan have been analyzed for their fatty acid compositions. The oils of *Citrus sinensis* L., *Citrus reticulata* and *Citrus paradisi* respectively contain 14 : 0 ; 0.083, 0.0 and 0.32, 16 : 0 ; 38.26, 13.4 and 32.62, 16 : 1 ; 4.43, 0.0 and 0.0, 18 : 0 ; 6.24, 19.8 and 2.53, 18 : 1 ; 34.88, 13.3 and 31.74, 18 : 2 ; 14.4, 52.7 and 29.25, 18 : 3 ; 0.0 traces and 3.46% acids in their glycerides. The amount of the oil is available estimated at 3,200 tons/annum.

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YIELD RESPONSE OF ELEVEN VARIETIES OF WHEAT TO IRRIGATION REGIMES

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(Received February 2, 1977 ; revised June 16, 1977)

Abstract. The yield response of 11 varieties of wheat (6 varieties imported from Mexico, *viz.*, Cajema, Jupateco, Nuri, Potam, Torim, Yeccora ; and 5 local varieties, *viz.*, Barani-70, Maintenance 157, Mexi-Pak-65, Pak-70, T-J. 75,) to four irrigation regimes (0, 7.5, 15.0, 22.5 cm water) was studied in the field. Among the newly introduced varieties Nuri and Jupateco gave the highest yields. Nuri yielded best under low and Jupateco under high irrigation.

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EXTENSION OF EFFECTIVE MASS THEORY FOR EXCITONS

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(Received February 17, 1977 ; revised May 16, 1977)

Abstract. The common effective mass theory for excitons is reviewed. It is pointed out that there is a close agreement between this theory and experiments for all excitonic states except for the case $n=1$. In view of the attainable high optical resolution, this deviation is rather substantial in modern spectroscopy. We ascribe this deviation mainly to the use of static dielectric constant for all exciton radii and partly to the truncation of the effective Hamiltonian expansion at ∇^2 terms. The ordinary theory is extended here by devising a suitable interpolation formula for a non-static dielectric function and expanding the effective Hamiltonian upto ∇^4 terms. The solutions of the extended effective mass equation are obtained for $n=1$ excitons by the variational method and for higher states by the perturbation method. The results of the extended theory show remarkable agreement with experiments.

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DETOXIFICATION OF MUSTARD SEED CAKE

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(Received May 15, 1976)

Abstract. Pakistan is the third largest producer of rape and mustard seeds in the world. The cake of the seeds after the extraction of the oils is used for incorporation into animal feed, with the rest being used as a manur or is exoprted. The cake containg 45% crude protein is not being utilized properly. The present study concerns itself with the detoxification of the mustard seed cake so that it is properly utilized.

Short Communications

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STUDY OF THE OXIDATION OF PLATINUM (II) WITH HEXAMINECOBALT (III) TRICARBONATOCOBALTATE (III)

MUHAMMAD HANIF, MAHMOOD AHMAD and MUHAMMAD SARWAR CHAUDHRY

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THE EFFECT OF SOME SULPHUR FUNGICIDES ON POWDERY MILDEW OF CHILLIES

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