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Physical Sciences Section

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VISCOSITY STUDIES ON CTAB-*p*-NITROPHENYL ACETATE SYSTEMS*

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(Received February 11, 1979; revised August 5, 1979)

The viscosities of cetyltrimethyl ammonium bromide (CTAB) solutions with and without *p*-nitrophenyl acetate (PNPA) have been measured with suspended level viscometers at 30° in distilled water, in carbonate-bicarbonate buffer at pH 9.2 and in various solutions of KBr. The reduced specific viscosity of the micelles of each system was calculated and plotted against micellar concentration. Changes in the physical nature of the micelles, i.e. size and particularly shape in the region of $10^{-2}M$ CTAB have been proposed and discussed.

**THE EFFECT OF POTASSIUM BROMIDE ON CRITICAL MICELLE
CONCENTRATIONS OF A CATIONIC SURFACTANT IN BUFFER AND
NONBUFFER SYSTEMS***

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(Received February 11, 1979; revised July 4, 1979)

The effect of KBr on critical micelle concentrations (CMC's) of a cationic surfactant, cetyltrimethyl ammonium bromide (CTAB) in the absence of buffer at pHs between 8.0 – 10.0 using a pH-stat technique was investigated. A study was also carried out in the presence of buffer at pH 9.2 and the results are compared. The CMCs were found to be independent of pH over the region studied. The addition of carbonate–bicarbonate buffer and KBr both reduced the CMC. The results give strong support to the fact that only the counterions of added salt make a contribution to the shift of the CMC.

SOME NEW DERIVATIVES OF TETRAHYDROHARMINE

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(Received August 12, 1979)

A study of von Braun BrCN reaction has been carried out on tetrahydroharmine. As an extension of this reaction, the cyano derivative thereby formed has yielded on mild hydrolysis a product, the structure of which has been established through chemical and spectral evidence as N-amido tetrahydroharmine.

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COPPER (I) COMPLEXES WITH PHOSPHINE AND OXINE

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(Received May 5, 1979; revised August 15, 1979)

Some new copper (I) complexes containing mixed ligands and bearing the general formule $[\text{CuX}(\text{PPh}_3)(\text{HOx})]_2$ (where PPh_3 = triphenylphosphine and HOx = 8-hydroxyquinoline, and $\text{X} = \text{Cl}^-$, Br^- , I^- , NO_3^- and SCN^-) have been studied and appear to have dimer and distorted tetrahedral structures having anion bridging.

DETERMINATION OF CYSTEINE IN PRESENCE OF CYSTINE

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(Received May 19, 1979; revised July 28, 1979)

Selenium dioxide has been used for the determination of cysteine in presence of cystine. The orange color produced is measured at 400 nm. This method is specific for cysteine while cystine does not give any color. Microgram quantities have been determined quite precisely and accurately.

Short Communication

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**COLORIMETRIC DETERMINATION OF
PEROXYDISULPHATE**

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(Received November 25, 1978; revised August 22, 1979)

following general equation.



The reaction between iron, cobalt, and nickel and $\text{S}_2\text{O}_8^{--}$ is appreciably fast while that between copper and $\text{S}_2\text{O}_8^{--}$ is slow. Nevertheless, the reaction between copper and $\text{S}_2\text{O}_8^{--}$ is accelerated in the presence of dil sulphuric acid containing a little Cl^- . These metals produce coloured ions which can be determined by colorimetric method, thus providing a means for the colorimetric determination of $\text{S}_2\text{O}_8^{--}$. However, iron cannot be employed for this pur-

Biological Sciences Section

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PENTACYCLIC TRITERPENOIDS FROM LEAVES OF SOME DIOSPYROS SPECIES

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(Received March 29, 1979 revised August 11, 1979)

α -Amyrin and bauerenol were isolated from the leaf extracts of *Diospyros kirkii* Hiern and *D. mespiliformis* Hochst ex A. DC. A mixture of three triterpenoid acids was obtained from each of the above extracts, as well as from leaves of *D. usambarensis* F. White. Betulin and betulinic acid were isolated from leaves of *D. consolatae* Chiov. Betulinic acid and α -amyrin were obtained from leaves of *D. verrucosa* Hiern and *D. cornii* Chiov, respectively, lupeol being obtained from the bark of the latter plant as well. One saturated keto alcohol was isolated from twigs of *D. usambarensis* and another from *D. consolatae* bark. C13-NMR spectra of bauerenol and bauerenyl acetate are partially assigned.

Short Communication

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**SOME OBSERVATIONS ON THE POST
CYPRID STAGES AND POPULATION
STRUCTURE OF *CONCHODERMA*
VIRGATUM VAR. *HUNTERI* FROM
OFFSHORE WATERS OF PAKISTAN**

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waters of Pakistan (Fig. 1) on board the Research Vessel 'R/V Dr. Fridtjof Nansen' from February to April 1977. Samples were preserved in 5% neutralized formaline. The measurements were taken accurate up to 0.01 mm.

RESULTS

Table 1 shows the occurrence of *Charybdis smithii* collected from various stations in the catches of R/V Dr. Fridtjof Nansen' in the offshore waters of Pakistan during February – April 1977. Although a total of 186 fishing stations were made all along the offshore waters of Pakistan from January to June 1977 by 'R/V Dr. Fridtjof Nansen' but the crabs were found on a few stations only. The data regarding the fishing stations on which the *C. smithii* were

Technology Section

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

Part XXXV. *Ferula assafoetida* Linn. (Hing) Seed Oil

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(Received June 10, 1979)

Physicochemical investigations on the essential oil from the fresh seeds of *Ferula assafoetida* have been carried out for the first time with a view to exploiting the indigenous raw material of the country. The essential oil with an 1.5% yield is constituted of α -pinene (1.43%), phellandrene (5.48%), an unidentified monoterpene (2.99%), secondary butyl propenyl disulphide (35.12%), geranyl acetate (7.71%), bornyl acetate (9.33%), α -terpineol (12.71%), a mixture of α -terpineol and an unknown alcohol (2.10%), myristic acid (21.23%) and a mixture of coumarins (1.90%). Secondary butyl propenyl disulphide, the major constituent of the oil, is attributed to the characteristic smell of the essential oil.

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

Part XXXVI. *Pycnocycla aucheriana*, Dence (Bibibuto) Seed Oil

Amna Karim, Muhammad Ashraf and Muhammad Khurshid Bhatti

PCSIR Laboratories, Lahore 16

(Received June 10, 1979).

The essential oil recovered from the seed of *Pycnocycla aucheriana* has been characterized and studied with respect to its physicochemical properties and chemical composition for the first time. The oil with an 0.35% yield contains α -thujene (0.2%), camphene (0.5%), β -pinene (2.6%), myrcene (0.4%), β -phellandrene (0.6%), γ -terpinene (2.4%), *p*-cymene (1.1%), β -elemene (0.2%), β -caryophyllene (0.1%), humulene (0.6%), myristicin (6.1%), linalyl acetate (2.6%), a ketonic compound (1.7%), linalool (41.2%), cuminyl alcohol (32.6%) and a mixture of coumarins (4.4%). The essential oil from the seed of the species can find good position in perfumery because of its pleasant fruity smell.

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

Part XXXVII. *Torilis japonica* (Hautt). DC (Laithy) and *Torilis leptophylla* (L), (Reichb) Seed Oils

Muhammad Ashraf, Rafi Ahmad, Bushra Asghar and Muhammad Khurshid Bhatti

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(Received June 10, 1979)

The essential oils recovered from the two species of *Torilis* have been investigated for their physico-chemical properties and chemical composition. The oils from *Torilis japonica* and *Torilis leptophylla*, with 0.002% yield in both cases respectively contain α -thujene (0.3, 0.0%), α -pinene (0.9, 0.1%), camphene (1.4, 0.4%), β -pinene (2.1%, traces), Δ^3 -carene (2.3, 0.9%), α -phellandrene (4.1, 1.9%), limonene (2.4, 2.3%), β -phellandrene (1.7, 3.4%), γ -terpinene (1.9, 0.6), *p*-cymene (0.4, 1.3%), β -caryophyllene (4.4, 12.4%), unknown sesquiterpene (1.2, 8.9%), bornyl acetate (16.2, 22.1%), bornyl acetate and geranyl acetate (1.1, 1.5%), geranyl acetate (31.1, 8.0%), carotol (0.0, 1.9%), *p*-methoxy benzyl acetate (0.0, 7.9%) and a mixture of coumarins (11.9, 14.8%). Even though the essential oils possess a pleasant smell yet their chance of being commercialized is not bright because of the low yield of the oils. However, pharmacological investigation on the plants is expected to show some interesting results because some special of this genus such as *Caucalis microcaopa* and *Tordylium afficinole* have been used for rattlesnake bites and also as emmenagogue.

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

Part XXXVIII. *Bunium cylindricum*, (Boiss & Hoh), Drude (Zira khar) Seed Oil

Amna Karim, Muhammad Ashraf and Muhammad Khurshid Bhatti

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(Received July 3, 1979)

The essential oil of two varieties of the seed of *Bunium cylindricum*, with 1.4 and 1.8% yield, has been investigated with respect to its percentage yield, physicochemical properties and chemical composition. The *Safed (white) zira khar* is composed of α -pinene (2.3%), camphene (1.0%), myrcene (0.7%), ϵ -3-carene (0.7%), α -phellandrene (0.5%), limonene (13.7%), γ -terpinene (3.5%), *p*-cymene (1.4%), unidentified monoterpene (0.4%), myristicin (67.2%), dillapiole (traces), cuminaldehyde (2.1%), unknown ketone (1.1%), elemol (4.0%) and juniper camphor (1.1%) while the *siah (black zira khar)* contains α -pinene (0.3%), camphene (0.3%), Δ^3 -carene (0.2%), limonene (0.7%), γ -terpinene (0.6%), unknown monoterpenes (0.3%), β -elemene (0.6%), β -caryophyllene (4.5%), humulene (2.7%), β -selinene (10.9%), *l*-cadinene (13.4%), bornyl acetate (1.0%), myristicin (4.1%), dillapiole (11.0%), elemicin (39.3%), an unknown ketone (0.9%), elemol (3.0%) and juniper camphor (6.2%). The seed of these species are chiefly used as an adulterant of *Bunium persicum*.

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

Part XXXIX. *Aegopodium burtii* E. Nasir (Sholkonar) Oil of the Whole Plant

Muhammad Ashraf, Rafi Ahmad and Muhammad Khurshid Bhatti

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(Received July 3, 1979)

The percentage yield, physicochemical characteristics and chemical composition of the essential oil of *Aegopodium burtii* have been determined. The oil, with a yield of 0.1% contains α -pinene (14.4%), camphene (6.3%), limonene (7.6%), β -caryophyllene (4.5%) geranyl acetate (10.9%), geranyl and bornyl acetate (5.4%), bornyl acetate (3.9%), thymol (10.0%) ethyl hexyl phthalate (21.1%), an unknown alcohol (5.1%), lauric acid (9.7%) and tarry material (2.1%). The persence of ethyl hexyl phthalate in the Umbelliferae species is an interesting finding. The species is used against stomach disorders by the local inhabitants.

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

Part XL, *Scandix pecten-veneris*, Linn (Eng. Venus's comb; local, Jungli sowa) Seed Oil

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(Received July 3, 1979)

Physical values and chemical composition of the essential oil distilled from the mature seed of *Scandix pecten-veneris* cultivated in Lahore, have been studied for the first time. The oil with a yield less than 0.1% contains α -thujene (1.54%), α -pinene (2.57%), camphene (4.00%), β -pinene (1.69%), limonene (4.69%), γ -terpinene (4.51%), 2-undecanone (1.20%), lauric acid (38.00%), 2-undecanoic acid (7.31%) and a mixture of coumarins and tarry material (23.25%). The plant possesses a considerable medicinal importance.

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

Part XLI *Seseli libanotis*, (L), W. KOCH (Chota Eachga) Seed Oil

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The percentage yield, physicochemical values and the chemical composition of the essential oil steam-distilled from the fresh mature seed of *Seseli libanotis* have been determined. The oil is constituted of santene (0.08%), α -thujene (2.33%), α -pinene (2.73%), α -fenchene (0.38%), camphene (0.28%), sabinene (6.18%), β -pinene (0.78%), myrcene (2.45%), α -phellandrene (4.87%), Δ^3 -carene (0.40%), γ -terpinene (6.50%), β -ocimene-x (9.20%), β -ocimene-y (0.88%), 2,6-dimethyl-oct-1-*trans*, 3,7-triene (0.09%), terpinolene (0.10%), linalool (0.10%), borneol (0.03%), terpinon-4-ol (0.08%), geraniol (0.15%), trimethyl benzyl alcohol (0.05%), longipinene (0.08%), humulene (0.38%), β -bourleonene (1.52%), β -elemene (1.15%), *trans*- β -farnesene (0.68%), β -caryophyllene (0.78%), β -selinene (1.93%), alloaromadendrene (14.60%), humulene (3.68%), α -muurolene (0.58%), α -farnesene (0.95%), longifolene (1.53%), α -cadinene (2.80%), isolongifolene (0.90%), 1, 3-5-triisopropyl benzene (0.68%), α -selinene (0.76%), β -bisabolene (6.81%), γ -muurolene (1.19%), a hydroxy ester (4.80%) and a mixture of coumarins (6.85%). The oil is chiefly composed of terpenes, i.e. 88% of the total oil.

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

Part XLII. *Bupleurum linearifolium*, D.C. (Yarguli) Seed Oil

Muhammad Ashraf and Muhammad Khurshid Bhatti

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The essential oil of *Bupleurum linearifolium* seed, with a yield of 0.2% has been studied with respect to its physicochemical properties and chemical composition. The oil is composed of santene (6.1%), α -thujene (1.9%), α -pinene (2.3%), camphene (3.0%), myrcene (2.4%), β -phellandrene (2.8%), limonene (2.5%), γ -terpinene (1.5%), *p*-cymene (0.9%), an unknown ketone (1.6%), geranyl acetate (7.5%), citronellyl acetate (7.1%), a mixture of hydroxy compounds (2.0%), borneol (3.0%), bupleurol (9.0%), α -terpineol (19.5%) and a mixture of coumarins (18.3%). *Bupleurum* species have been used against stomach and liver diseases. The commercial importance of the oil can only be evaluated after studying physiological effects of the oil. However, the species, which we have successfully cultivated at Murree, may be tried against liver diseases.

EFFECT OF ICE STORAGE PRIOR TO FREEZING ON THE QUALITY OF FROZEN-SHRIMP

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(Received April 29, 1979; revised September 12, 1979)

Studies have been carried out to determine the effect of ice storage prior to freezing on the subsequent quality of frozen shrimp. The quality was evaluated both organoleptically and by objective means. It was observed that quality of frozen shrimp is inversely proportional to the time of ice-storage prior to freezing. Data are presented to indicate that shrimp frozen after 10-day ice-storage are poorer in quality and result in an unacceptable product. Shrimp kept in ice for 0-3 days give a superior quality product on freezing and those kept for 4-10 days give inferior (medium) quality shrimp on freezing as compared to shrimp kept for 0-3 days in ice. Proposals for obtaining superior quality frozen shrimp are made.

STUDIES ON THE PROLONGATION OF KEEPING QUALITY OF SHRIMP IN ICE

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Twenty dip solutions were screened for their ability to prevent black spot formation (melanosis) and quality loss during the storage of shrimp in melting ice. The criteria used besides organoleptic judgement were the bacterial count, the content of total volatile bases (TVB), trimethylamine nitrogen (TMA-N), and α - amino nitrogen and pH of the shrimp. A treatment with oxytetracycline (30 ppm) and sodium metabisulphite (800 ppm) was found to offer a practical means of preventing melanosis and improving public health and sanitary quality aspects of the distribution and marketing of shrimp.

EFFECT OF MICRONUTRIENTS ON THE YIELD OF WHEAT IN NWFP

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(Received May 2, 1979; revised July 5, 1979)

Field experiments were conducted to see the effect of Cu, Zn and B on the grain yield of wheat at Ratta Kulachi, D.I. Khan and Tarnab, Peshawar. Four levels of Cu, Zn and B were applied to the soils at 0, 2.5, 5.0 and 10.0 kg/ha. In addition Cu, Zn and B were used in different combinations. 135 kg of N and 100 kg of P_2O_5 /ha were used as a basic dose.

At both the locations a corresponding increase in the grain yield of wheat was obtained as the levels of Cu, Zn and B supply were increased. The individual favourable effect of Cu, Zn and B on the grain yield of wheat have further been enhanced significantly by the combined application of Cu, Zn and B at 5 kg/ha each.

PRESERVATION OF SHELL EGGS WITH DIFFERENT COATING AGENTS

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(Received March 26, 1979)

White leghorn eggs were treated with different levels of chlorinated wax emulsion, liquid paraffin and carboxymethyl cellulose. After incubation at 35° for 6 weeks the loss in weight of eggs was least for eggs treated with 6 and 9% wax emulsion than nontreated and eggs treated with carboxymethyl cellulose and liquid paraffin. The air cell size, yolk and white indices as well as flavour characteristics of eggs treated with 6 and 9% levels showed the good retention of quality as compared with control eggs even after storage for 42 days at 35° . The eggs treated with liquid paraffin and carboxymethyl cellulose deteriorated much earlier than with the eggs treated with 6 and 9% wax emulsion. This shows the superiority of wax emulsion over all other treatments tried for the preservation of the shell eggs.

Short Communication

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**ALUMINIUM AMALGAM—A GENERAL
REDUCING AGENT**Aftab Beg Chughtai, M. Akhtar Javed and
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(Received May 21, 1977; revised August 6, 1979)

Table 1. Comparison of aluminium amalgam with other
reducing agents.

Compound reduced	Product	Percentage yield with conventional method	
		Al-Hg	
Nitrobenzene	Aniline	80.5	72.0 ³
Benzaldehyde	Hydrobenzoin	79.0	70.0 ⁶
Benzyl chloride	Toluene	4.3	35.0 ⁷
<i>p</i> -Toluene sulphonyl chloride	Thio- <i>p</i> -cresol	15.0	90.0 ⁴
Benzonitrile	Phenyl ethylamine	5.0	53.4 ⁸
Lauronitrile	<i>n</i> -Dodecylamine	20.0	52.0 ⁹
<i>n</i> -Bromohexane	<i>n</i> -Hexane	45.0	50.0 ¹⁰
Anthraquinone	Anthrahydroquinone	99.0	96.0 ¹¹