Coden: PSIRAA 19 (5-6) 197-282 (1976)

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 19, Nos. 5-6, October-December 1976

Physical Sciences. Pages 197-216

Biological Sciences. Pages 217-238

Technology. Pages 239-277

Published bimonthly by

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH
KARACHI

Physical Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

QUANTITATIVE ESTIMATIONS OF ANTIMONY(III), MERCURY(II) AND BISMUTH(III) WITH 1,3-DIMORPHOLINOPROPANE

M. Sakhawat Hussain, Taj Ali, Falak Naz and S. Marghoob Ali

Department of Chemistry, University of Peshawar, Peshawar

(Received July 7, 1976)

Abstract. New quantitative procedures for the determination of Sb(III), Hg(II) and Bi(III) based on their precipitation with 1,3-dimorpholinopropane are reported. The precipitates are obtained in acidic solutions in the presence of an excess of iodide. The compound are weighed as $[C_{11}H_{22}O_2N_2H_2][SbI_4]_2$, $[C_{11}H_{22}O_2N_2H_2][HgI_4]$ and $[C_{11}H_{22}O_2N_2H_2][BiI_5]$ and have the lowest chemical factors so far reported. In case of Bi(III) quantitites less than 50 mg, the precipitate was dissolved in dimethysulphoxide and subjected to spectrophotometric measurement at suitable wavelengths.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

SOME FUNDAMENTAL STUDIES WITH COBLAT(III) ACETATE FOR ITS USE IN REDOX REACTIONS WITH ORGANIC SUBSTANCES IN NONAQUEOUS MEDIA

ZAFARULLAH SHEIKH, JAN DOLEZAL* and J. ZYKA*

Institute of Chemical Engineering and Technology, Panjab University, Lahore

(Received June 28, 1976)

Abstract. Result of fundamental studies regarding the use of Cobalt (III) acetate for the study of oxidation of organic substances in nonaqueous media have been reported.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5-6, October-December 1976

THE DETERMINATION OF PHENOL BY THE RING-OVEN TECHNIQUE

MUHAMMAD HANIF, FARHAT JAMSHAID, TEHSEEN AMAN and M. H. HASHMI

PCSIR Laboratories, Lahore 16

(Received July 2, 1976; revised August 29, 1976)

Abstract. A simple, quick, precise and sensitive method for the determination of phenol has been devised and the effect of interferences has been studied by Weisz ring-oven technique. The shelf-life of the standard scale has also been investigated.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

REACTION OF CROWN-POTASSIUM WITH 1,3-DINITROBENZENE AND 4-NITROBENZYL FLUORIDE

MAHBOOB MOHAMMAD

Department of Chemistry, University of Islamabad, Islamabad

(Received March 22, 1976; revised August 29, 1976)

Abstract. Reaction of crown-potassium with 1,3-dinitrobenzene produces Meisenheimer complex while with 4-nitrobenzyl fluoride the anion radical of 4-nitrobenzyl fluoride is produced.

Pakistan J. Sci. Ind. Res., Vol., 19, Nos. 5–6, October–December 1976

CHEMICAL COMPOSITION OF THE BROWN SEAWEED CYSTOSEIRA BARBATA AND ISOLATION OF A SULPHATED HETEROPOLYSACCHARIDE

M. M. Hussein, N. M. El-Sayed and A. F. Abdel-Fattah

National Research Centre, Dokki, Cairo, A.R. Egypt

(Received May 15, 1976; revised August 23, 1976)

Abstract. The composition of the brown seaweed *Cystoseira barbata* was investigated. A sulphated heteropolysaccharide containing glucuronic acid, galactose, mannose, fucose, xylose, glucose and a protein moiety has been extracted from the alga with HCl or trichloroacetic acid. In both cases, glucose was a minor component. The proportion of sugars in the algal polysaccharide differed according to the extracting agent and the conditions of extraction.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

CARBOHYDRATE CONSTITUENTS OF ZAHDI DATES (PHOENIX DACTYLIFERA L.)

M. UDDIN* and M. A. KHALIL†

College of Agriculture and Forestry, University of Mosul, Hammam Al-alil, Mosul, Iraq

(Received January 16, 1976)

Abstract. Zahdi dates contain D-glucose and D-fructose in equimolar proportion, as major sugar constituents, with a small amount of sucrose. Pectic substances, hemicelluloses and cellulose are present as cell-wall polysaccharides. The soluble sugars have been isolated on a preparative scale from the samples of Zahdi dates and some preliminary investigations have been done on these carbohydrate constituents.

Short Communications

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, Oct–Dec 1976

THERMAL REARRANGEMENT OF 3-HYDROXY-2-(HYDROXYPHENYL)-3-METHYL-3H-INDOLE

B. ROBINSON and M. UPPAL ZUBAIR*

Manchester University, Manchester, U. K.

(Received August 18, 1976)

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, Oct–Dec, 1976

SYNTHESIS OF SPONGOCYTIDINE

G. R. NIAZ and FASIULLAH KHAN

Department of Applied Chemistry, University of Karachi, Karachi 32

S. M. IFZAL

Department of Chemistry, University of Karachi, Karachi 32

(Received February 24, 1977)

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, Oct–Dec 1976

REACTION OF STEROLS WITH DMSO AND ACETIC ANHYDRIDE: FORMATION OF 3β-ACETOXYMETHOXY CHOLEST-5-ENE

S. M. IFZAL and REHANA AHMED

Department of Chemistry,
University of Karachi, Karachi 32

G. R. NIAZ

Department of Applied Chemistry,
University of Karachi, Karachi 32

(Received February 25, 1976; revised April 12, 1977)

Biological Sciences Section

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5-6, October–December 1976

THE LYGAEINAE (HETEROPTERA: LYGAEIDAE) OF PAKISTAN*

ABDUL HAMID† and KHUJISTA MEHER

Department of Biological Sciences, University of Lagos, Lagos, Nigeria

(Received June 24, 1976; revised August 18, 1976)

Abstract. This paper reports twenty species of Lygaeinae from Pakistan. Ten of these are new recrods. In addition, five more species that are likely to be found in Pakistan are mentioned. Brief descriptions for newly recorded species are included. Additional locality data is given for four species of *Spilostethus* and for *Karachicoris seidenstueckeri* Stys. Dorsal views and male and female genitalia of the newly recorded species and *Karachicoris seidenstueckeri* Stys are illustrated. Host plants are reported for a number of species. Geographic distribution of the 25 species is briefly discussed.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5-6, October-December 1976

A STUDY OF EGGS AND IMMATURE STAGES OF TWO CLOSELY RELATED SYMPATRIC SPECIES OF OXYRHACHIS GERMAR (HOMOPTERA : MEMBRACIDAE)

IMTIAZ AHMAD and ISMAT ABRAR

Department of Zoology, University of Karachi, Karachi 32

(Received June 10, 1976)

Abstract. The eggs and immature stages of two closely related sympatric species, *Oxyrhachis taranda* (F.) and *Oxyrhachis serratus* Ahmad and Abrar are described and illustrated. The total time taken to complete the life cycle of former species from egg to adult is noted to be 34–38 days. As the eggs of *O. serratus* never hatched in the laboratory, the time taken to complete life cycle from 1st instar to adult is noted to be 34–36 days. The characters of eggs and immature stages are compared and used in separating the above closely related sympatric species. A key to separate various instars of both species is also presented. The correlation coefficient (r) of the values of corresponding lengths and widths of eggs of the two species is calculated by standard statistical methods.

Technology Section

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

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

Part III. *Cuminum cyminum* Linn. (Cumin, Safed zira) seed oil

AMNA KARIM, MASOOD PERVEZ and M. K. BHATTY

PCSIR Laboratories, Lahore 16

(Received July 15, 1975; revised June 16, 1976)

Abstract. The essential oil of the seed of *Cuminum cyminum* Linn cultivated in Pakistan has been studied for the first time with respect to its physicochemical constants and chemical composition. Samples of the oil as distilled from the seed of the Peshawar and Quetta regions were obtained in 3.5 and 3.0% yields and consisted of α-pinene (1.1 and 0.7%), β-pinene (14.3 and 19.7%), limonene (0.4 and 1.5%), γ-terpinene (11.5 and 16.3%) *p*-cymene (6.0 and 2.7%), cuminaldehyde (22.4 and 20.0%), 1,4-*p*-menthadien-7-al (23.6 and 24.3%), 1,3-*p*-menthadian-7-al (13.5 and 11.5%) and cuminyl alcohol (7.2 and 3.7%) respectively. The Pakistan cumin seed contains a volatile oil comparable to those recorded for seed of good commercial quality from other geographical sources.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

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

Part IV. *Apium graveolens* Linn. (Celery, Ajmodh) Seed Oil

AMNA KARIM and MUHAMMAD KHURSHID BHATTY

PCSIR Laboratories Lahore 16

(Received August 4, 1975)

Abstract. The essential oil as well as the water cohobation oil of the seed of *Apium graveolens* grown in the Jhelum and Lahore districts has been studied for the first time with respect to its physicochemical characteristics and chemical composition. For the two areas the essential oil has been obtained in 2.5% and 2.6% yield while its composition is α-pinene (1.0, 0.5%), β-pinene (1.5, 0.8%), mycrene (3.1, 6.1%), limonene (35, 37%), *p*-cymene (3.1, 2.5%), β-elemene (3.5, 1.5%), β-caryophyllene (4.1, 3.1%), β-selinene (32.5, 28.5%), 3-isolbutylidene-3a,4-dihydrophthalide (0.7, 1.0%), carvone and dihydrocarvone (0.4, 1.0%), eudesmol (1.0, 0.5%), γ-terpineol (0.3, 0.5%), n-butylphthalide (5.0, 7.2%), and sedanonic anhydride (8.0, 7.9%) respectivley. The water cohobation, oils' yield and composition in the same order are 0.55% and 0.49% and α-pinene (traces, 0.5%), β-pinene (traces, 0.3%), myrcene (2.0, 3.5%, limonene (2.8, 3.0%), *p*-cymene(1.0, 1.2%), β-caryophyllene (2.4, 1.6%), humulene (1.4, 3.2%), β-selinene (1.3, 1.1%), 3-isobutylidene-3a.-4-dihydrophthalide (0.6, 0.3%), carvone and dihydrocarvone (0.7, 1.2%), n-butylphthalide (25.0, 20.0%), and sedanonic anhydride (60.0, 63.0%).

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

EXTRACTION AND EXAMINATION OF ANODIC DIFFUSION LAYER

Q. IQBAL

Department of Chemistry University, of Engineering and Technology, Lahore

(Received May 18, 1976; revised November 1, 1976)

Abstract. An attempt has been made to extract the anodic diffusion layer by the porous electrode technique. The diffusion layer extracted under static conditions on porous nickel in sodium chloride reveals the existence of a sort of supersaturated metal chloride solution. The pH value of the layer ranges between 5.1–5.4. The rate of extraction is to be controlled carefully to ensure the quality of diffusion layer. The technique can be used successfully for the extraction of the diffusion layer.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

COLD SETTING STUDIES OF FOUNDRY SANDS BONDED WITH FURAN RESINS

AZIZUR REHMAN, IFTIKHAR AHMAD and KHALID MASOOD

PCSIR Laboratories, Lahore 16

(Received September 10, 1975; revised June 7, 1976)

Abstract. Cold setting characteristics of furan resins were studied on a laboratory scale by treating with phosphoric acid. Resins incorporating various sugars were prepared and their setting characteristics studied. It was found that the amount of acid required for maximum strength was critical. Addition of water to the system enhanced the rise in strength of the binder. Resins containing hexose, produced a very strong bond and the rise in strength was rapid.

Experiments to study the curing mechanism of the resins indicated the possibility that at low levels of catalyst addition, the acid and the resin formed concentric films around the sand grains and the curing of the resin occurred by diffusion of hydrogen ions through an interface between the films.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

A STUDY OF EGYPTIAN BENTONITE BY X-RAY DIFFRACTION METHOD

A.S. EL-HITI*

Physics Department, Tanta University, Egypt

(Received September 23, 1975; revised August 5, 1976)

Abstract. Newly discovered Egyptian bentonite was subjected to detailed methods of X-ray diffraction analyses. The oriented aggregate method was used in the preparation of the sample for the examination of clays. The advantage of this method is that the enhancement of diagnostic (001) reflections allows them to be seen when the mineral is present in small proportions. X-ray quantitative analysis was carried out using an internal standard method. The raw mineral was composed of bentonite clay and free silica. It is a mixture of 67% bentonite and 33% free silica. The results were compared and discussed in terms of the patterns of widely distributed bentonites from the U.S.A., Germany and the USSR.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5-6, October-December 1976

RELATIVE EFFICIENCY OF DIFFERENT EXTRACTANTS FOR DETERMINATION OF AVAILABLE PHOSPHORUS IN THE PUNJAB SOILS

DOST MUHAMMAD MALIK and MOHAMMAD SARWAR

Soil Fertility Survey and Soil Testing Institute, Risalewala, Lyallpur

(Received March 22, 1976)

Abstract. Studies were carried out to determine the relative P-extracting efficiency of Bray I, $NaHCO_3$and H_2O at different soils in the Punjab. It was observed that the P-values estimated through Bray I method were invariably high and were followed by values as 0.5M $NaHCO_3$ and H_2O at all locations. The correlation coefficients of 0.83 and 0.75 were found respectively for Bray I-P and H_2O-P with $NaHCO_3$. The regression equations for estimated values were:

P-Bray I = 1.78 P-$NaHCO_3$—2.08
P-H_2O = 0.79 P-$NaHCO_3$—0.68

The soil–plant relation studies also showed insignificant differences between calculated and actual yields with these extractants.

The findings thus proved that the efficiency of these extractants for soil P estimation and their interchangeable use with the considerable degree of reliability.

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5–6, October–December 1976

IMPROVEMENT IN DYEING OF FELLMONGERED WOOL WITH CHROME AND REACTIVE DYES

ABDUR RAZZAQ, AMIR MOHAMMAD KHAN and MUMTAZ A. KHAN

PCSIR Laboratories, Peshawar

(Received July 14,1976; revised August 12, 1976)

Abstract. Samples of shorn and fellmongered wool (obtained by sulphide painting process) were collected from a tannery in Karachi. The alkali damage of all the wool samples was determined. The samples were dyed with chrome and reactive dyes, and optimum conditions for level dyeing of fellmongered as well as the blend of fellmongered and shorn wool were established. Moreover, difficulties in scouring of fellmongered wool were also discussed and remedies suggested.

Review Paper

Pakistan J. Sci. Ind. Res., Vol. 19, Nos. 5-6, October-December 1976

SEASONING AND DIMENSIONAL STABILIZATION OF WOOD

M. ASLAM

PCSIR Head Quarters, Karachi

(Received February 18, 1977)