



*Coden:* PSIRAA 31(5) 315-384 (1988)

# PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Vol. 31, No. 5, May 1988

Physical Sciences. Pages 315-345

Biological Sciences. Pages 346-370

Technology. Pages 371-380

Published monthly by

PAKISTAN COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH  
KARACHI

# Physical Sciences Section

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## QUESTION OF SECONDARY PEAK IN HARDNESS VERSUS RETROGRESSION TIME CURVE OF AA-7075 ALUMINIUM ALLOYS

Fukhruddin Habiby, Anwar ul Haq, Fakhrul Hassan Hashmi and Abdul Quadeer Khan

*Dr. A.Q. Khan, Research Laboratories, P.O. Box 502, Rawalpindi*

(Received March 7, ; revised June 2, 1988)

In 1974 Cina reported a new heat treatment process called retrogression and reaging for AA-7075 aluminium alloys to improve its resistance to stress corrosion cracking while maintaining its peak strength. Retrogression at a particular temperature, as a function of time, yields a secondary peak for hardness and strength. Present investigations indicate that the secondary peak is only a fluctuation in hardness values and has no physical existence. This has been confirmed by electrical resistivity measurements. Microstructural changes responsible for decrease in hardness during retrogression process have also been investigated by transmission electron microscope (TEM).

*Key words* : Hardness, Retrogression, AA-7075.

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## SPECTROSCOPIC STUDIES ON 3,5-DIMETHOXY-PARAHYDROXYPHENYLPROPANE COMPOUNDS

Lal Khan, S.S.H. Zaidi and Mansoor Ahmed\*

*NPSL, Islamabad*

(Received October 27, 1987; revised May 30, 1988)

3,5-dimethoxy-para-hydroxyphenylpropane compounds were isolated from *Triticum vulgare* and *Saccharum sponstrum*. IR, UV, HNMR and mass spectra were recorded to establish the structure of these compounds. IR and UV results were in good agreement with the HNMR and MS studies.

*Key words:* Waste materials, Chemical shifts, Moities.

**A COMPARATIVE STUDY OF VARIOUS COMPLEXING REAGENTS FOR THE SOLVENT  
EXTRACTION BASED REMOVAL OF MERCURY FROM NATURAL WATERS**

M. Jaffar, M. Ashraf and Shahid Pervaiz

*Department of Chemistry, Quaid-i-Azam University, Islamabad*

(Received March 30, 1986; revised June 1, 1988)

## DISTRIBUTION OF MACRO AND MICRO-ELEMENTS IN MARINE INVERTEBRATES FROM KARACHI

Pirzada J. A. Siddiqui\*, Zahur Akbar\*\* and Rashida Qasim

*Department of Biochemistry, University of Karachi, Karachi-32*

(Received December 3, 1987; revised April 27, 1988)

This study includes three species of crab (*Portunus pelagicus*, *P. sanguinolantus* and *Scylla serrata*); gastropod (*Telescopium telescopium*); sea cucumber (*Actinopyga mauritiana*); star fish (*Astropecten indicus*); and *Aurelia* sp. Macro-elements studied were sodium, potassium, calcium, magnesium and phosphorus. Estimation of microelements includes manganese, copper, iron, zinc, nickel, cobalt, lead and cadmium. Iron concentration was highest in all the invertebrates followed by the zinc content. Lead was detected only in *A. mauritiana* and *A. indicus*; nickel was present in *A. indicus* and *Aurelia* species cobalt and cadmium were only recorded in *A. indicus* and *Aurelia* sp., respectively. The concentration of metals was high enough to be alarming.

*Key words:* Pollution indicator, Macroelements, Microelements, Invertebrate.

## POTENTIAL ENERGY CALCULATIONS OF NALBUPHINE HYDROCHLORIDE

M. A. Haleem, Meena Ramzan Ali and Zafar S. Saify\*

*Biophysics Unit, Department of Biochemistry, Faculty of Science, University of Karachi*

(Received January 18, 1987; revised June 14, 1988)

Agonistic and antagonistic behaviour of some of the opioids led to the reassessment of the geometrical nature of bonding with the receptor surface. During the course of present work, potential energy calculations are carried out to find out the mode of binding and to examine the concept of bireceptor phenomenon. The structure of nalbuphine may be considered as a link between that of the pure antagonist naloxone and potent agonist morphine. Nalbuphine is a potentially analgesic exhibiting agonist properties. The allowed conformations are found to be at  $W_1 = 50^\circ$  to  $80^\circ$  and  $240^\circ$  –  $360^\circ$  respectively. The remaining non allowed regions are found to be at  $W_1 = 0$  to  $30^\circ$  and  $120^\circ$  to  $360^\circ$  and  $W_2 = 100^\circ$  to  $220^\circ$ .

*Key words:* Nalbuphine, Opioids, Narcotics.

**REACTIONS OF 5-ACETOACETYL-6-METHOXY-2, 3-DIPHENYLBENZOFURAN AND ITS ISOMERIC  
6-ACETOACETYL-5-METHOXY-2, 3-DIPHENYLBENZOFURAN WITH AMINOAZOLES\***

Ezz El-Din Mohamed Kandeel and Mohamed Abbas Metwally\*

*Department of Chemistry, University of Mansoura, Mansoura, Egypt*

(Received March 6, 1988; revised June 27, 1988)

5-Acetoacetyl-6-methoxy-(I) and 6-acetoacetyl-5-methoxy-2, 3-diphenylbenzofuran (V) undergoes condensation with aminoazoles to give the condensation products pyrazolopyrimidines (IIa and VIa), pyrimidol [1, 2-a] benzimidazoles (IIIa and VIIa) and pyrazolopyridines (IVa and VIIIa).

*Key words:* Aminoazoles, Heterocyclic compounds, Bridge head nitrogen.

**QUANTITATIVE KINETIC STUDY OF SALICYLIDENE-*p*-AMINOSALICYLIC ACID FORMATION**

F.A. Adam and M.T.El-Haty

*Chemistry Department, Faculty of Science, Aswan, Egypt*

(Received October 12, 1986; revised June 14, 1988)

The rate of formation of salicylidene-*p*-aminosalicylic acid has been investigated in the absence and presence of piperidine as a basic catalyst in ethanol medium. The reaction rate is followed spectrophotometrically by measuring the absorbance at  $\lambda_{\text{max}}$  of the formed product. The rate-determining step is suggested to be the attack of amine on the aldehyde and not the elimination of water as previously suggested. The quantitative addition of piperidine, the buffer solutions and the temperature effect on the reaction rate were investigated and discussed.

**Key words:** Kinetic study, Salicylidene, *p*-Amino salicylic acid.



## VISCOSITIES OF BINARY MIXTURES OF TRICHLOROETHYLENE WITH SOME ALIPHATIC, ALICYCLIC AND SUBSTITUTED AROMATIC HYDROCARBONS

K. Ramanjaneyulu, K.N. Surendranath and A. Krishnaiah

*Department of Chemistry, College of Engineering, S.V. University, Tirupati – 517 502, India*

(Received February 16, 1988; revised June 14, 1988)

Viscosities of binary mixtures of trichloroethylene with *n*-hexane, *n*-heptane, cyclohexane, methylcyclohexane, toluene, chlorobenzene, bromobenzene and nitrobenzene were measured at 303.15 K. The values of  $\eta^E$  are negative in all the systems except in mixtures containing toluene and chlorobenzene. An inversion of sign is observed in the case of trichloroethylene + chlorobenzene and positive in the case of trichloroethylene + toluene. The viscosity data were analysed in terms of absolute reaction rate and the free volume theories of liquid viscosity. Further the study was extended to evaluate interaction parameter, (d).

*Key words:* Viscosity, Absolute reaction rate theory, Free volume theory.

# Biological Sciences Section

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## EFFECT OF ETHANOL ON BRAIN AND HEPATIC TRYPTOPHAN METABOLISM IN RABBIT

Tahira Perveen, Darakhshan J. Haleem and M.A. Haleem

*Department of Biochemistry, University of Karachi, Karachi-32*

(Received September 29, 1987; revised June 18, 1988)

Acute ethanol administration increases serum free tryptophan but decreases total tryptophan concentration. Tryptophan pyrrolase activity is decreased after two hours, brain tryptophan and 5 hydroxy tryptamine concentrations are increased. It is suggested that ethanol enhances brain tryptophan metabolism because it alters the availability of circulating tryptophan to the brain and decreases its hepatic catabolism.

*Key words:* Ethanol, Brain, Tryptophan.

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## EFFECT OF GLUCOSE ON THE DISTRIBUTION OF TRYPTOPHAN IN SERUM LIVER AND BRAIN

Abdur Rehman Siddiqi, Darakhshan J. Haleem and M.A. Haleem

*Department of Biochemistry, Biophysics Unit, University of Karachi, Karachi - 32*

(Received November 27, 1986; revised June 8, 1988)

Effect of glucose administration has been studied on the distribution of tryptophan in serum, liver and brain of rabbits. Glucose administration caused a considerable fall in serum free tryptophan with a concomitant increase in tryptophan binding to serum albumin. A significant increase of total tryptophan was found in serum, liver and brain.

*Key words :* Effect of glucose, Tryptophan.

**GROWTH AND MORPHOMETRIC CHARACTERISTIC IN THE HORSE-SHOE CRAB,  
*CARCINOSCORPIUS ROTUNDICAUDA* (LATREILLE) FROM CANNING (WEST BENGAL), INDIA**

A. Chatterji, R. Vijayakumar and A. H. Parulekar

*National Institute of Oceanography, Dona Paula, Goa-403 004, India*

(Received April 13, 1988; revised June 27, 1988)

A significant relationship was observed between carapace length – body weight/carapace width/carapace weight and body weight – carapace weight of the horse-shoe crab, *Carcinoscorpius rotundicauda* (Latreille). Increase in weight was found to follow the cube law in females. The two curves of males and females intersected between the carapace length 130-135 mm which showed the length at which the animal attained sexual maturity. The carapace width grew faster at higher carapace length in females as compared to males whereas, carapace weight in males was more at higher carapace length.

*Key words:* Growth, Morphometric characteristic, *Carcinoscorpius rotundicauda*.

## STUDIES ON GROWTH OF *AGARICUS BITORQUIS* (QUEL) SACE. ON DIFFERENT CULTURE MEDIA AND SUBSTRATES

Sh. Muhammad Iqbal, Sultan M. Khan\* and Naseer Alam Khan

*National Agricultural Research Centre, Islamabad*

(Received August 9, 1987; revised February 28, 1988)

An experiment was conducted with a view to determine the pattern of growth of *Agaricus bitorquis* on different culture media and substrates. Three culture media, namely complete medium, malt extract medium and potato dextrose medium were tried for linear growth of the fungus. All the three culture media were sterilized and poured in 90 mm petri dishes and incubated at 25°. The data were recorded after every 48 hours till the completion of the fungal growth. Spawn of mushroom was prepared on three different cereal grains of wheat, barley and sorghum.

Of the three media tried, complete medium gave the maximum radial colony diameter of the fungus followed by malt extract and potato dextrose. Sorghum grains were found to be the best grains on which the fungus took only 20 days to complete its growth. The difference in the time taken by sorghum grains for complete growth of fungus was statistically significant as compared to wheat and barley grains. However, there were no significant differences in days taken for full growth of the fungus on wheat and barley. Also, synthetic compost doses of 300 and 350 gms per 5 kgs of the substrate were identified as the optimum doses.

*Key words:* *Agaricus bitorquis*, Mushrooms cultivation, Faisalabad, Pakistan.

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## EFFECTS OF CULTURAL CONDITIONS ON $\alpha$ -AMYLASE PRODUCTION BY *PENICILLIUM EXPANSUM*

M. Umar Dahot, H. Latif Siddique\*, Fozia Hassan\* and A.R. Memon

*Department of Biochemistry, Institute of Chemistry, University of Sind, Jamshoro*

(Received August 24, 1987; revised May 5, 1988)

Experiments were conducted to investigate the conditions of  $\alpha$ -amylase (E.C. 3.2.1.1) production by *Penicillium expansum* strain CMI 39761. The optimal conditions of  $\alpha$ -amylase production in submerged culture with culture time 48 hr, temperature 37° and initial pH 6.5. Millet husk finely powdered was used as a carbon source. The addition of starch, maltose as C sources and NaNO<sub>3</sub>, peptone as N sources to millet husk fine powder medium were effective for  $\alpha$ -amylase production.

*Key words: Penicillium expansum, Millet husk,  $\alpha$ -Amylase.*

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## **RADIATION INDUCED SHORT STATURE, EARLY MATURING MUTANTS IN BASMATI RICE (*ORYZA SATIVA* L.)**

Akbar A. Cheema and M.A. Awan

*Nuclear Institute for Agriculture and Biology, P.O. Box 128, Faisalabad*

(Received March 10, 1988; revised May 29, 1988)

Seeds of two indica rice cultivars viz Basmati 370 and Basmati 198 were irradiated with different dosages of gamma rays to induce short stature and earliness. A large number of early flowering and short stature mutants were selected in M2 generation. Most of the mutants segregated for earliness and plant height in M3 generation. Four short statured mutants of Basmati 370 viz. DM16-5-1, DM16-5-2, DM-2 and DM107-4 and an early flowering mutant of Basmati 198 namely EF-76-1 were finally selected. These mutants were further studied for their agronomic characteristics in M4. Reduction in plant height ranged from 18-43 % in the short stature mutants. While the early flowering mutant flowered three weeks earlier than the parent variety Basmati 198.

*Key words:* Rice, Mutations, Earliness and Short stature.

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## STUDIES ON SEED-BORNE MYCOFLORA OF CHILLIES AND CONTROL OF FRUIT ROT DISEASE

Nasreen Sultana, S.A. Jamil Khan and A.K. Khanzada

*Crop Diseases Research Institute, Pakistan Agricultural Research Council, Karachi University Campus*

(Received February 16, 1988; revised May 16, 1988)

Fifteen chillies seed samples from different places in Sind, were analysed by ISTA techniques. 24 fungi were isolated, including 12 species in Pakistan. The seedling symptoms test showed that species *Fusarium moniliforme* and *Alternaria alternata* are seed transmitted. Both methods of infection (wounded and unwounded) differed significantly, enhancing fruit rot by different fungi. Fungicides viz., Benomyl and Captan were found effective in controlling fruit rot of chillies.

**Key words:** Chillies, Seed-borne mycoflora, Incubation, Techniques, Transmission, Fruit rot, Fungicides, Pakistan.



*Short Communication*

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

**ROLE OF MINOR MINERALS ON HUMAN HEALTH DIABETIC CONTROL WITH CHROMIUM  
CONTAINING HERBS**

**Part IV. Chromium Contents of the Herbs Used for Diabetic Control in Islamic System of Medicine  
Chromium-diabetes, Carbohydrates**

K. M. Janjua

*P.C.S.I.R. Laboratories, Lahore*

(Received July 8, 1985; revised June 13, 1988)

# Technology Section

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

## THE IDENTIFICATION AND ESTIMATION OF THE MUSTARD-OIL GLYCOSIDES (SINALBIN AND SINIGRIN)

T. K. Obidairo

*Department of Biochemistry, University of Benin, P.M.B. 1154, Benin City, Nigeria*

(Received January 6, 1988; revised June 15, 1988)

A technique is described for the chromatographic separation of sinalbin and sinigrin on paper and thin layer plates. A colourimetric method for the quantitative estimation of mustard oil glycosides has also been developed.

*Key words:* Mustard oil, Glycosides, Chromatography, Ninhydrin.

## STUDY ON DIFFERENCIATION OF COW AND BUFFALO LEATHER

Nishat Rizvi and Abdul Wadood Qureshi

*PCSIR Leather Research Centre, Karachi*

(Received January 31, 1988; revised June 13, 1988)

Microscopy is an important tool for the investigation of leather as the nature of leather depends largely on the properties of the fibres and the way in which they interweave. It is therefore possible to a great extent to assess the quality and nature of leather from micro scopical observation. Keeping in view the above factors, relating to hides and skins structure, the structure variation according to location on the same hide, and also the variation introduced by processing, various leather samples were processed from various parts i.e. butt, belly & shoulder from each of cow and Buffalo hide. While taking into consideration the structural variation influenced by processing, samples were also prepared using various tannages seperately and also in combination.

*Key words:* Leather differenciation, Cow leather, Buffalo leather.

***Short Communication***

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

**RAPID SPECTROPHOTOMETRIC DETERMINATION OF PLATINUM (II)†**

R. Palaniappan\* and V. Revathy

*Department of Analytical Chemistry, University of Madras, Guindy Campus, Madras 600 025, India*

(Received January 5, 1988; revised June 4, 1988)

*Short Communication*

Pakistan J. Sci. Ind. Res, Vol. 31, No. 5, May 1988

**A MODIFIED PREPARATIVE METHOD FOR 5, 7-DIBROMO-8-HYDROXYQUINOLINE**

Yusuf Ahmad, M.K. Bhatti and A. Majid-Hamid

*PCSIR Laboratories, Lahore-16*

(Received September 13, 1987; revised June 27, 1988)