

Physical Sciences

An Experimental Investigation of PAH Emissions from a Heavy Duty Diesel Engine Fuelled with Biodiesel and its Blend

Asad Naeem Shah, G.E. Yun-shan, TAN Jian-wei and Liu Zhi-hua 293

Recovery of Silver from X-ray Washings

Shakila Begum, Pir Aurang Zeb and Qazi Sharif 301

Comparative Study of Quality Changes in Okra *Abelmoschus esculentus* (L) Moench Stored at Different Relative Humidities

O.F. Adetuyi, A.U. Osagie and A.T. Adekunle 304

Determination of Pesticide Residue Levels in Omani and UAE Vegetable Farm Soils

F.A. Talukder, W. Kaakeh, M.L. Deadman and J.H. Al Dahmani 309

Biological Sciences

Prevalence and Pathology of Helminth Infections in Pigs

Ausraful Islam, Anisuzzaman, Shankar Majumder, A.K.M. Arifur Rabbi and Md. Mokbul Hossain 317

Concentration of Electrolyte Reserves of the Juvenile African Catfish *Clarias gariepinus* (Burchell, 1822) Exposed to Sublethal Concentrations of Portland Cement Powder in Solution

Mohammed Kabir Adamu and O. Arimoro Francis 323

A List of Damselflies (Zygoptera: Odonata) Recorded from Azad Jammu and Kashmir, Pakistan

Ahmed Zia, Muhammad Naeem, Muhammad Ather Rafi and Soaib Ali Hassan 329

Technology

Response Surface Methodology for the Optimization of Alpha Amylase Production by *Serratia marcescens* SB08

C.K. Venil and P. Lakshmanaperumalsamy 333

Short Communication

Beneficiation of Malakand Graphite Ore

K.R. Kazmi, M. Arif Bhatti, M. Shafique Anwar and Ansar Mehmood 340

Review

Sesquiterpenes: The Potent Antioxidants

**Abdul Latif Khan, Hamayun Khan, Javid Hussain, Mohammad Adnan, Iqbal Hussain, Taous Khan
and Abdur Rahman Khan**

343

Contents of Volume 51 (No.1-6)

i

Author Index of Volume 51

viii

Subject Index of Volume 51

xi

Physical Sciences

7741-GH

1. An Experimental Investigation of PAH Emissions from a Heavy Duty Diesel Engine Fuelled with Biodiesel and its Blend

Asad Naeem Shah, G.E. Yun-shan, TAN Jian-wei and Liu Zhi-hua 293

7663-SI

2. Recovery of Silver from X-ray Washings

Shakila Begum, Pir Aurang Zeb and Qazi Sharif 301

7587-GH

3. Comparative Study of Quality Changes in Okra *Abelmoschus esculentus* (L) Moench Stored at Different Relative Humidities

Adetuyi F., Osagie A.U and Adekunle A.T 304

7719-GH

4. Determination of Pesticide Residue Levels in Omani and UAE Vegetable Farm Soils

F.A. Talukder, W. Kaakeh, M.L. Deadman and J.H. Al Dahmani 309

Biological Sciences

7524-SI

5. Prevalence and Pathology of Helminth Infections in Pigs

Ausraful Islam, Anisuzzaman, Shankar Majumder, A.K.M. Arifur Rabbi and Md. Mokbul Hossain 317

7673-SI

The Concentration of Electrolyte Reserves of the Juvenile African Catfish *Clarias Gariepinus* (Burchell, 1822) Exposed to Sublethal Concentrations of Portland Cement Powder in Solution

Mohammed Kabir Adamu and O. Arimoro Francis 323

7665-SI

7. A List of Damselflies (Zygoptera: Odonata) Recorded from Azad Jammu and Kashmir (AJ&K)

Ahmed Zia, Muhammad Naeem, Muhammad Ather Rafi, and Soaib Ali Hassan 329

Technology

7748-SI

8. Response Surface Methodology for the Optimization of Alpha Amylase Production by *Serratia marcescens* SB08

C.K. Venil and P. Lakshmanaperumalsamy 333

Short Communication

7382-SA

9. Beneficiation of Malakand Graphite Ore

K.R. Kazmi, M. Arif Bhatti, M. Shafique Anwar and Ansar Mehmood 340

Review

7692-SI

10. Sesquiterpenes: The Potent Antioxidants

Abdul Latif Khan, Hamayun Khan, Javid Hussain, Mohammad Adnan, Iqbal Hussain, Taous Khan and Abdur Rahman Khan 345

An Experimental Investigation of PAH Emissions from a Heavy Duty Diesel Engine Fuelled with Biodiesel and its Blend

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(received October 16, 2008; revised November 28, 2008; accepted November 30, 2008)

Abstract. For the comparison of emissions of polycyclic aromatic hydrocarbons (PAHs) from diesel, biodiesel and its 20% blend with diesel, and their carcinogenic potencies, an experimental study has been conducted on a turbocharged, intercooled and direct injection diesel engine. Total PAHs (solid and gas) from diesel, B20 and B100 at low load were more than those at high loads. Total PAH emissions from the test fuels at the rated speed were more than those at maximum torque speed. Benzo[a] pyrene (BaP) brake specific emission of biodiesel is less than that of diesel. LMW-PAH emissions for the test fuels are all higher than those of MMW and HMW PAH. Biodiesel and B20 reduce both the total Benzo[a]pyrene equivalent concentration (BaP_{eq}) and the total mean-PAHs as compared to commercial diesel fuel. BSFC of the engine increased but its brake power decreased in the cases of B20 and biodiesel.

Keywords: diesel engines, biodiesel, polycyclic aromatic hydrocarbons, carcinogenic potencies

Recovery of Silver from X-ray Washings

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(Received May 22, 2008; revised December 2, 2008; accepted December 4, 2008)

Abstract. This paper presents the enhanced recovery of silver from polymers and gelatin in X-ray washings by treating with activated carbon at different temperatures and optimizing the parameters as temperature, pH and acid base concentrations. It was found that at pilot scale silver recovery increased through treatment with activated carbon and in comparison to the temperature of 20 °C, at 50 °C, the recovery increased from 82.57% to 94.04%.

Keywords: silver recovery, activated carbon, X-ray washings

Comparative Study of Quality Changes in Okra *Abelmoschus esculentus* (L) Moench Stored at Different Relative Humidities

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(received November 21, 2007; revised November 06, 2008; accepted November 12, 2008)

Abstract. Okra (*Abelmoschus esculentus* L) pods were stored at the relative humidity of 90% and 100% for up to 10 days. The moisture content, crude fibre, and protein, fat, viscosity, hydrolysable and condensed tannin, total phenol, vitamin C and reducing power of the okra were determined on alternate days. Okra pods stored at 100%RH experienced the least percentage loss in all the determined parameters though the loss of antinutrient was lower at this relative humidity.

Keywords: relative humidity, antioxidant, okra, storage conditions

Determination of Pesticide Residue Levels in Omani and UAE Vegetable Farm Soils

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(received September 17, 2008; revised November 6, 2008; accepted November 9, 2008)

Abstract. In the investigation of 40 different vegetable growing farms of Al-Batinah (Oman) and Al - Ain (UAE) regions different pesticide residues were found to be present on all soil samples which varied in their types and levels according to the region. In Omani soil samples, cypermethrin was the most frequent pesticide, followed by chlorpyrifos, malathion, phenthoate, triazophos and deltamethrin. In UAE farm soil samples, chlorpyrifos, cypermethrin and deltamethrin were detected in all the regions, while phenthoate was detected in the Eastern and Northern regions only.

Keywords: pesticide residues, cypermethrin, chlorpyrifos, deltamethrin, malathion, agricultural soil, Oman, UAE

Biological Sciences

Pak. J. Sci. Ind. Res. 2008 51(6) 317-322

Prevalence and Pathology of Helminth Infections in Pigs

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(Received June 20, 2007; revised November 4, 2008; accepted November 6, 2008)

Abstract. In 30 viscera of local slaughtered pigs from different areas of Tangail and Mymensingh districts of Bangladesh, six species of helminths were identified; 2 of them were trematodes namely *Fasciolopsis buski* (36.70%) and *Gastrodiscoides hominis* (26.70%) and 4 species were nematodes namely *Ascaris suum* (60%), *Metastrongylus elongatus* (53.33%), *Stephanurus dentatus* (10%) and *Physocephalus sexalatus* (56.71%). Three nematode species, viz. *M. elongatus* extracted from lung, *S. dentatus* from peri-renal fat and *P. sexalatus* from stomach, were recorded for the first time in pigs in Bangladesh. No gross lesion was observed in pigs affected with *M. elongatus*. In *A. suum* infection, intestinal wall was infiltrated with plasma cells, lymphocytes and eosinophils. In *M. elongatus* infection, lymphocytes and macrophages mainly eosinophilic infiltration was observed in the parenchyma of lung. Age exerted a significant ($p < 0.05$) influence on the development of the helminths, *P. sexalatus*, *F. buski*, *A. suum* and *G. hominis*.

Keywords: helminth infection, pigs, Bangladesh

Concentration of Electrolyte Reserves of the Juvenile African Catfish *Clarias gariepinus* (Burchell, 1822) Exposed to Sublethal Concentrations of Portland Cement Powder in Solution

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(received May 31, 2008; revised November 11, 2008; accepted November 14, 2008)

Abstract. The study investigated the effect of sublethal concentrations (39.10, 19.55, 9.87 and 0.00 mg/l) of Portland cement powder in solution on the electrolyte reserves (sodium, potassium, calcium, chloride and inorganic phosphorus) in the serum, liver and kidney of the juvenile African catfish *Clarias gariepinus* after a 15 day exposure period. The basic function of the determined electrolyte reserves in the body lies in controlling fluid distribution, intra and extra cellular acidobasic equilibrium, maintaining osmotic pressure of body fluid and normal neuro-muscular irritability. The result revealed significant ($P < 0.05$) changes in serum sodium, potassium, calcium and chloride and insignificant ($P > 0.05$) changes in inorganic phosphorus. Sodium, calcium, chloride and inorganic phosphorus and potassium were significantly ($P < 0.05$) and insignificantly ($P > 0.05$) different in liver and kidney, respectively. Ipso-facto, the effector organs *viz.* liver and kidney of teleost species – *Clarias gariepinus* which are primarily responsible for regulating water and ionic movement between external and internal milieu of fishes are susceptible to deleterious effects of Portland cement powder thus sublethal concentration (39.10 mg/l) of Portland cement powder in solution after a 15 day exposure has been most toxic and debilitating to the test fish.

Keywords: portland cement, electrolyte reserves, serum, liver, kidney, *Clarias gariepinus*.

A List of Damselflies (Zygoptera: Odonata) Recorded from Azad Jammu and Kashmir, Pakistan

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(Received May 23, 2008; revised August 26, 2008; accepted September 9, 2008)

Abstract. In the intensive survey of the valley of Kashmir for updating the record of damselflies inhabiting the region, a total of 15 genera and 31 species of damselflies were collected during the summer season of three consecutive years (2005-2007) which are reported.

Keywords: damselflies, Zygoptera, Odonata, Azad Jammu and Kashmir, Pakistan

Technology

Pak. J. Sci. Ind. Res. 2008 51(6) 333-339

Response Surface Methodology for the Optimization of Alpha Amylase Production by *Serratia marcescens* SB08

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(received November 3, 2008; revised December 10, 2008; accepted December 12, 2008)

Abstract. In this work, central composite design combining with response surface methodology was successfully employed to optimize medium composition for the production of alpha amylase by *Serratia marcescens* SB08 in submerged fermentation. The process parameters that influence the enzyme production were identified using Plackett-Burman design. Among the various factors screened, inoculum concentration, pH, NaCl and CaCl₂ were found to be most significant. The optimum level of pH was 5.0, inoculum concentration 3%, NaCl 0.30 g/l and CaCl₂ 0.13 g/l. The actual enzyme yield before and after optimization was 56.43 U/ml and 87.23 U/ml, respectively. Thus, it is advisable to the microbial industry sponsors to apply such profitable bioprocess to maintain high yield for mass production of α amylase.

Keywords: alpha amylase; fermentation; *Serratia marcescens*; Plackett-Burman design; central composite design

Short Communication

Beneficiation of Malakand Graphite Ore

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(received May 13, 2006; revised May 19, 2008; accepted July 10, 2008)

Abstract. On beneficiation of an indigenous graphite ore of Malakand, Pakistan, on laboratory and pilot plant scale by froth flotation technique, the ore, which initially contained 17% graphitic carbon, was upgraded to a graphite concentrate containing 84% graphitic carbon with more than 70% recovery. The concentrate conforms to the specifications of the foundry grade graphite. Maximum recovery is achieved at pH 7.5 and pulp density of 33% solids with a dose of 0.14 kg/ton sodium silicate, 2.2 kg/ton kerosene oil and 0.02 kg/ton pine oil.

Keywords: froth flotation, graphite, beneficiation, Malakand graphite ore

Review

Pak. J. Sci. Ind. Res. 2008 51(6) 343-350

Sesquiterpenes: The Potent Antioxidants

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(received July 5, 2008; revised November 11, 2008; accepted November 14, 2008)

Abstract. Sesquiterpenes (STs) are 15 carbon terpenoids, having significant phytomedicinal, phytotoxic and agrochemical potentials. They are found to be present in the essential/edible oils and have also been reported from numerous plant species. In this review article, the antioxidant potentials of STs isolated from various plants have been presented. As the antioxidants prevent, protect or reduce the damaging/aging of the cell, therefore, they are of prime importance. This review will provide the literature on the antioxidative potency of STs probably for the first time, which could be used as scientific data base for the researchers working in this field.

Keywords: sesquiterpenes, sesquiterpene lactones, antioxidant, plant extracts, biologically active compounds

Pak. J. Sci. Ind. Res. 2008, 51(1-6)

Contents

Vol. 51, No. 1, January - February 2008

Editorial Note

Physical Sciences

- Geotechnical Study of Sub-Surface Sediments in Sirajgonj Town and its Adjoining Areas, Bangladesh
Md. Sultan-Ul-Islam, Md. Shamsuzzaman and Md. Badrul Islam 1
- Synthesis of 3', 4', 5, 6, 7-Pentamethoxy-8-C-Prenylflavone
M. Amzad Hossain and Zhari Ismail 11
- Effect of Microwave and Sand Roasting on Physicochemical Values and Fatty Acids of
Cicer arietinum (White Gram) and *Vigna mungo* (Black Gram) Oils
Lubna Liaquat, Shahnaz Hamid, Bushra Khalid and Javed Iqbal Khan 15
- Peanut Hull as Biosorbent for Removal of Reactive, Acid and Disperse Dyes from
Aqueous Solutions
S. Rehman Khan, Asma Inayat and H. Rehman 19

Short Communication

- Steroid Estimation in Different Dental Application
Lubna Iqbal, Kauser Siddique, Nighat Afza, Salma Rehman, Afsheen Arshad
and Mohammad Saleem 24

Biological Sciences

- Different Agroresidues Used in Solid Substrate Fermentation for α -Amylase
Production by *Bacillus subtilis*-239
M. Yousaf, M. B. Bhatti, S. Baig, M. Nadeem and Z. Nasreen 26
- Growth Response and Ionic Relation in Two *Brassica* Species under Water Stress Conditions
Badr-uz-Zaman, M. Salim, Rehana Asghar, B.H. Niazi, Imdad Ali Mahmood and Arshad Ali 31
- Estimates of Genetic Parameters from Line x Tester Mating Design for Some
Quantitative Traits in Upland Cotton, *Gossypium hirsutum* L.
Muhammad Jurial Baloch, Moula Bux Kumbher, Wajid Ali Jatoi and Nasreen Fatima 36

Short Communication

- Formulation and *in vitro* Evaluation of a Cosmetic Multiple Emulsion from Olive Oil
Naveed Akhtar, Mahmood Ahmed, Marina Akram and Ahmad Mahmood Mumtaz 42

Technology

- Beneficiation Studies on Low-Grade Stibnite Ore of Chitral, NWFP, Pakistan
M. Arif Bhatti, K. R. Kazmi, M. Sharif Nizami, M. Shafique Anwar and M. Habib 45

Review

Regulation of Arachidonic Acid Metabolism in the Human Fetus and the Neonate

Sheikh Arshad Saeed, Muhammad Atif Waqar, Areeba Jawed, Rushna Pervez Ali and Muhammad Anwar Waqar

52

Vol. 51, No. 2, March - April 2008

Physical Sciences

Origin of Opal-CT in Lower Eocene Tallahatta Formation, Mississippi, USA and Pleistocene Barind Clay Formation in Bangladesh: A Comparative Study

Sohail Kabir

61

Studies on the Peroxo Complexes of Thorium (IV) Containing Organic Acids and Amine Bases

Jahanara Nasrin and M. Saidul Islam

65

Quantization of Bupirone Hydrochloride in Pure and Pharmaceutical Formulations by Spectrophotometric Method

Asrar A. Kazi, Amina Mumtaz, Mohammad Usman Sabri and Mir Anjum Javed

72

Proximate Composition, Nutritionally Valuable Minerals and the Effects of Some Salts on the Functional Properties of Silkworm (*Anaphe infracta*) Larvae

El Adeyeye

77

Short Communication

Assessment of Groundwater Recharge in Semi-Arid Region of Northern Nigeria

Obiejesi Luke Ndubuisi

86

Biological Sciences

Transplacentally Transmitted Congenital Brucellosis due to *Brucella abortus* Biotype 1 in Sprague-Dawley Rats

M. S. Rahman and B. K. Baek

89

Potential Industrial Uses and Quality of Oil of Palm Weevil, *Rhynchophorus phoenicis* F. (Coleoptera: Curculionidae)

O. T. Omotoso and C. O. Adedire

93

Effect of Halopriming on Sunflower Seed Germination and Seedling Establishment under Saline Environment

A. Shahzad, I. A. Mahmood, Madeeha Khan and A. Ali

98

Performance of Maize Cultivars for Fodder Production under Rainfed Conditions of Pothohar Tract

Zulfiqar Ali Gurmani, M. Shafiq Zahid, M. Imran and Ashiq Saleem

103

Performance of Newly Released Dry Land Wheat Varieties under Barani and Minor Irrigated Conditions Muhammad Jamal, Muhammad Suleman, M. Shah Sawar Khan and Abdul Latif	107
---	-----

Review

From Chemistry to Biology: Furanic Complexes as Samples Gilles Bouet	111
--	-----

Vol. 51, No. 3, May - June 2008

Physical Sciences

Synthesis and Reactions of Some New Substituted Benzoxazin-4-One and Quinazolin-4-One M. E. Shaban, A. M. Youssef, N. K. El-Aasar and A. K. El-Ziaty	119
--	-----

Synthesis of Some 2-Methyl-3-(Arylthiocarbamido) Quinazol-4-Ones and 2-Methyl-3-(Arylidencarboxamido) Quinazol-4-Ones as Potential Antimicrobial Agents B. D. Gupta	124
---	-----

Some Physical Characteristics and Nutritional Composition of the Seeds of Wild Pepper (<i>Erythrococca anomala</i>, Benth) E. A. Akande, G. O. Adegoke and F. C. Mathooko	128
---	-----

Relative Study of the Colour Fastness of Cotton, Woolen and Silk Fabrics Dyed With Walnut Bark Dye Bushra Khalid, Azra Yaqub, Lubna Liaquat and Mohammad Sohaib	131
---	-----

Quantitation of Fatty Acids by GLC and Separation of Omega-6 Nutraceutical Fatty Acid From <i>Carthamus tinctorius</i> L. Seed Oil Cultivated in Pakistan Rubina Saleem, Ambrat, Zahra Yaqeen and Tehmina Sohail	136
--	-----

Major Ion Chemistry of Groundwaters From the Peshawar Intermontane Basin, NWFP, Pakistan M. Asim Yousafzai	140
--	-----

Short Communication

Determination of Positional Isomers of Monoenoic Fatty Acids Separated From Seed Oils of <i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> Amran Waheed, Muhammad Saleem and Shahid Mahmud	147
---	-----

Biological Sciences

Stimulatory Effect of Medium Ingredients on Alkaline Protease Production by <i>Bacillus licheniformis</i> N-2 and Compatibility Studies With Commercial Detergents Muhammad Nadeem, Javed Iqbal Qazi, Shahjahan Baig and Quratulain Syed	150
--	-----

Antidiarrhoeal Evaluation of Some Nigerian Medicinal Plants Used in Bini Traditional Folk Medicine

Flossy I. Obuekwe and Ihuoma C. Onyejekwe 158

Short Communication

Proximate Composition of Head of Wild and Farmed *Catla catla*

Amana Nadeem, Farhana Liaqat, Bilal Hussain and K. Iqbal 163

Review

A Comprehensive Systematic Pharmacological Review on *Harpagophytum procumbens* DC. (Devil's claw)

Elisabetta Miraldi, Marco Biagi and Daniela Giachetti 165

Vol. 51, No. 4, July - August 2008

Messages

Shehryar Khan, Chairman PCSIR (iii)

Jamil Ahmed Chaudhry, Member Science PCSIR (v)

Editorial

Kaniz Fizza Azhar, Executive Editor (vii)

Special Paper

Fifty Years of Pakistan Journal of Scientific and Industrial Research-An Overview With Reference to PCSIR Laboratories

Shafiq Ahmad Khan and Muhammad Saleem 177

Physical Sciences

Phylogenetic and Computational Structure-Function Studies of α -1, 4-Glucosidase (Maltase) From Baker's Yeast (*Saccharomyces cerevisiae*)

Mushtaq Hussain, Javed A. Qureshi, Shagufta A. Shaikh and Liaquat Sultana 185

Study of Structure and Properties of Thermoplastic Polyurethanes

A. Shokuhi Rad, M. Ardjmand and K. Mahmoodi 191

Preparation and Evaluation of Ciprofloxacin Hydrochloride Floating Oral Delivery System

Sujata Mohapatra, Sunit Kumar Sahoo, Subhakanta Dhal, Bhupen Chandra Behera, Bhakti Bhusan Barik and Bijan Kumar Gupta 201

Biological Sciences

- Molecular and Biochemical Evaluation of Genetic Effects of *Calotropis procera* (Ait.) Latex on *Aspergillus terreus* Thom**
Sameer H. Qari 206
- Evaluation of Antiemetic Activities of Alcoholic Extract of *Grewia asiatica* in Experimental Model Dog**
Zahra Yaqeen, Tehmina Sohail, Atiq-ur-Rahman, Muhammad Saleem and Zakir-ur-Rehman 212
- Genetic Analysis of Fibre and Earliness Parameters in F₂ Progenies of Intra-hirsutum Crosses**
W. A. Jatoi, M. J. Baloch, N. F. Veesar, S.A. Panhwar, N. A. Panhwar and M. S. Majeedano 216
- Occurrence and Severity of Arsenic in Urine, Hair and Nails Through Contaminated Drinking Water in Pakistan**
Farooq A. Khan, Ameera Javed, Javed Iqbal, Alia B. Munshi and Ishratullah Siddiqui 220

Review

- Food and Drug Interaction - a Growing Concern**
M. Humayoun Akhtar 225

Vol. 51, No. 5, September - October 2008

Physical Sciences

- The Role of Rainfall Intensity and Soil in Determining Rates of Flow Through Cryoturbated Chalk**
M. Mahmood-ul-Hassan and P. J. Gregory 235
- Studies on Amylase Activity of Pancreatin Obtained from Bovine Pancreas**
Zaman Niazi, Kauser Siddiqui, Lubna Iqbal and Mehreen Lateef 242
- Metabolic Inhibitors as Stimulating Factors for Citric Acid Production**
Nehad Z. Adham, Essam M. Ahmed and Heba A. El Refai 245
- Chemical Variability of Fatty Acid Composition of Seabuckthorn Berries Oil from Different Locations by GC-FID**
Nusrat Shafi, Farina Kanwal, M. Siddique, E.G. Ghauri and M. Akram 250
- Applications of Lac Dye Using Different Mordants on Leather**
Bushra Khalid, Asma Inayat, Lubna Liaquat and Azra Yaqub 254
- Studies on Textile Sludge Treatment Options**
Imohimi O. Asia 258

Biological Sciences

- Antifungal Activity of the Liquid Obtained by Oxidative Cracking of Waste Paper**
Zahid Hussain, Shahnaz Perveen and Khalid M. Khan 264
- Development of an Unconventional Method to Control the Ectoparasites in Backyard Poultry**
I. S. Shanta, N. Begum, S. Majumder, Anisuzzaman and M. J. Karim 267
- Surveillance of Drinking Water of Karachi City: Microbiological Quality**
Shagufta Ambreen Shaikh, Nadia Gul and Liaquat Sultana 272
- Respiration, Quantum Yield of Photosynthesis and Transpiration of Two Mungbean Genotypes Differing in Salt Tolerance**
Md. Abdul Aziz, M. A. Karim, A. Hamid, Q. A. Khaliq, M. Hossain and A. J. M. S. Karim 276

Review

- Pesticide Immunoassays: Experience and Future Perspective in Pakistan**
Uzma Maqbool and M. Jamil Qureshi 281

Vol. 51, No. 6, November - December 2008

Physical Sciences

- An Experimental Investigation of PAH Emissions from a Heavy Duty Diesel Engine Fuelled with Biodiesel and its Blend**
Asad Naeem Shah, G.E. Yun-shan, TAN Jian-wei and Liu Zhi-hua 293
- Recovery of Silver from X-ray Washings**
Shakila Begum, Pir Aurang Zeb and Qazi Sharif 301
- Comparative Study of Quality Changes in Okra *Abelmoschus esculentus* (L) Moench Stored at Different Relative Humidities**
O.F. Adetuyi, A.U. Osagie and A.T. Adekunle 304
- Determination of Pesticide Residue Levels in Omani and UAE Vegetable Farm Soils**
F.A. Talukder, W. Kaakeh, M.L. Deadman and J.H. Al Dahmani 309

Biological Sciences

- Prevalence and Pathology of Helminth Infections in Pigs**
Ausraful Islam, Anisuzzaman, Shankar Majumder, A.K.M. Arifur Rabbi and Md. Mokbul Hossain 317

Concentration of Electrolyte Reserves of the Juvenile African Catfish <i>Clarias gariepinus</i> (Burchell, 1822) Exposed to Sublethal Concentrations of Portland Cement Powder in Solution Mohammed Kabir Adamu and O. Arimoro Francis	323
A List of Damselflies (Zygoptera: Odonata) Recorded from Azad Jammu and Kashmir (AJ&K) Ahmed Zia, Muhammad Naeem, Muhammad Ather Rafi and Soaib Ali Hassan	329
Technology	
Response Surface Methodology for the Optimization of Alpha Amylase Production by <i>Serratia marcescens</i> SB08 C.K. Venil and P. Lakshmanaperumalsamy	333
Short Communication	
Beneficiation of Malakand Graphite Ore K.R. Kazmi, M. Arif Bhatti, M. Shafique Anwar and Ansar Mehmood	340
Review	
Sesquiterpenes: The Potent Antioxidants Abdul Latif Khan, Hamayun Khan, Javid Hussain, Mohammad Adnan, Iqbal Hussain, Taous Khan and Abdur Rahman Khan	343
Contents of Volume 51 (No.1-6)	i
Author Index of Volume 51	viii
Subject Index of Volume 51	xi

Pak. J. Sci. Ind. Res. 2008, 51(1-6)
Author Index

- Adamu, Mohammed Kabir **51(6)** 323
Adedire, C. O. **51(2)** 93
Adegoke, G. O. **51(3)** 128
Adekunle, A.T. **51(6)** 304
Adetuyi, F.O. **51(6)** 304
Adeyeye, El **51(2)** 77
Adham, Nehad Z. **51(5)** 245
Adnan, Mohammad **51(6)** 343
Afza, Nighat **51(1)** 24
Ahmed, Essam M. **51(5)** 245
Ahmed, Mahmood **51(1)** 42
Akande, E. A. **51(3)** 128
Akhtar, M. Humayoun **51(4)** 225
Akhtar, Naveed **51(1)** 42
Akram, M. **51(5)** 250
Akram, Marina **51(1)** 42
Al Dahmani, J.H. **51(6)** 309
Ali, A. **51(2)** 98
Ali, Arshad **51(1)** 31
Ali, Rushna Pervez **51(1)** 52
Ambrat **51(3)** 136
Anisuzzaman **51(5)** 267
Anisuzzaman **51(6)** 317
Anwar, M. Shafique **51(1)** 45
Anwar, M. Shafique **51(6)** 340
Ardjmand, M. **51(4)** 191
Arshad, Afsheen **51(1)** 24
Asghar, Rehana **51(1)** 31
Asia, Imohimi O. **51(5)** 258
Aziz, Md. Abdul **51(5)** 276
Baek, B. K. **51(2)** 89
Baig, S. **51(1)** 26
Baig, Shahjahan **51(3)** 150
Baloch, M. J. **51(4)** 216
Baloch, Muhammad Jurial **51(1)** 36
Barik, Bhakti Bhusan **51(4)** 201
Begum, N. **51(5)** 267
Begum, Shakila **51(6)** 301
Behera, Bhupen Chandra **51(4)** 201
Bhatti, M. Arif **51(1)** 45
Bhatti, M. Arif **51(6)** 340
Bhatty, M. B. **51(1)** 26
Biagi, Marco **51(3)** 165
Bouet, Gilles **51(2)** 111
Dahmani, J.H. Al **51(6)** 309
Deadman, M.L. **51(6)** 309
Dhal, Subhakanta **51(4)** 201
El Adeyeye **51(2)** 77
El-Aasar, N. K. **51(3)** 119
El-Ziaty, A. K. **51(3)** 119
Fatima, Nasreen **51(1)** 36
Francis, O. Arimoro **51(6)** 323
Ghauri, E.G. **51(5)** 250
Giachetti, Daniela **51(3)** 165
Gregory, P. J. **51(5)** 235
Gul, Nadia **51(5)** 272
Gupta, B. D. **51(3)** 124
Gupta, Bijan Kumar **51(4)** 201
Gurmani, Zulfiqar Ali **51(2)** 103
Habib, M. **51(1)** 45
Hamid, A. **51(5)** 276
Hamid, Shahnaz **51(1)** 15
Hassan, M. Mahmood-ul **51(5)** 235
Hassan, Soaib Ali **51(6)** 329
Hossain, M. **51(5)** 276
Hossain, M. Amzad **51(1)** 11
Hossain, Md. Mokbul **51(6)** 317
Hussain, Bilal **51(3)** 163
Hussain, Iqbal **51(6)** 343
Hussain, Javid **51(6)** 343
Hussain, Mushtaq **51(4)** 185
Hussain, Zahid **51(5)** 264
Imran, M. **51(2)** 103
Inayat, Asma **51(1)** 19
Inayat, Asma **51(5)** 254
Iqbal, Javed **51(4)** 220
Iqbal, K. **51(3)** 163
Iqbal, Lubna **51(1)** 24
Iqbal, Lubna **51(5)** 242
Islam, Ausraful **51(6)** 317
Islam, M. Saidul **51(2)** 65
Islam, Md. Badrul **51(1)** 1
Islam, Md. Sultan-Ul- **51(1)** 1
Ismail, Zhari **51(1)** 11
Jamal, Muhammad **51(2)** 107
Jatoi, W. A. **51(4)** 216
Jatoi, Wajid Ali **51(1)** 36
Javed, Ameera **51(4)** 220
Javed, Mir Anjum **51(2)** 72
Jawed, Areeba **51(1)** 52
Jian-wei, Tan **51(6)** 293
Kaakeh, W. **51(6)** 309
Kabir, Sohail Kabir **51(2)** 61
Kanwal, Farina **51(5)** 250
Karim, A. J. M. S. **51(5)** 276
Karim, M. A. **51(5)** 276

- Karim, M. J. **51**(5) 267
 Kazi, Asrar A. **51**(2) 72
 Kazmi, K. R. **51**(1) 45
 Kazmi, K.R. **51**(6) 340
 Khalid, Bushra **51**(1) 15
 Khalid, Bushra **51**(3) 131
 Khalid, Bushra **51**(5) 254
 Khaliq, Q. A. **51**(5) 276
 Khan, Abdul Latif **51**(6) 343
 Khan, Abdur Rahman **51**(6) 343
 Khan, Farooq A. **51**(4) 220
 Khan, Hamayun **51**(6) 343
 Khan, Javed Iqbal **51**(1) 15
 Khan, Khalid M. **51**(5) 264
 Khan, M. Shah Sawar **51**(2) 107
 Khan, Madeeha **51**(2) 98
 Khan, S. Rehman **51**(1) 19
 Khan, Shafiq Ahmad **51**(4) 177
 Khan, Taous **51**(6) 343
 Kumbher, Moula Bux **51**(1) 36
 Lakshmanaperumalsamy, P. **51**(6) 333
 Lateef, Mehreen **51**(5) 242
 Latif, Abdul **51**(2) 107
 Liaquat, Farhana **51**(3) 163
 Liaquat Sultana **51**(4) 185
 Liaquat Sultana **51**(5) 272
 Liaquat, Lubna **51**(1) 15
 Liaquat, Lubna **51**(3) 131
 Liaquat, Lubna **51**(5) 254
 Mahmood, I. A. **51**(2) 98
 Mahmood, Imdad Ali **51**(1) 31
 Mahmoodi, K. **51**(4) 191
 Mahmud, Shahid **51**(3) 147
 Majeedano, M. S. **51**(4) 216
 Majumder, S. **51**(5) 267
 Majumder, Shankar **51**(6) 317
 Maqbool, Uzma **51**(5) 281
 Mathooko, F. C. **51**(3) 128
 Mehmood, Ansar **51**(6) 340
 Miraldi, Elisabetta **51**(3) 165
 Mohammad, Saleem **51**(1) 24
 Mohapatra, Sujata **51**(4) 201
 Mumtaz, Ahmad Mahmood **51**(1) 42
 Mumtaz, Amina **51**(2) 72
 Munshi, Alia B. **51**(4) 220
 N. Begum **51**(5) 267
 Nadeem, Amana **51**(3) 163
 Nadeem, M. **51**(1) 26
 Nadeem, Muhammad **51**(3) 150
 Naeem, Muhammad **51**(6) 329
 Nasreen Fatima **51**(1) 36
 Nasreen, Z. **51**(1) 26
 Nasrin, Jahanara **51**(2) 65
 Ndubuisi, Obiejesi Luke **51**(2) 86
 Niazi, B.H. **51**(1) 31
 Niazi, Zaman **51**(5) 242
 Nighat Afza **51**(1) 24
 Nizami, M. Sharif **51**(1) 45
 Obuekwe, Flossy I. **51**(3) 158
 Omotoso, O. T. **51**(2) 93
 Onyejekwe, Ihuoma C. **51**(3) 158
 Osagie, A.U. **51**(6) 304
 Panhwar, N. A. **51**(4) 216
 Panhwar, S.A. **51**(4) 216
 Perveen, Shahnaz **51**(5) 264
 Qari, Sameer H. **51**(4) 206
 Qazi, Javed Iqbal **51**(3) 150
 Qureshi, Javed A. **51**(4) 185
 Qureshi, M. Jamil **51**(5) 281
 Rabbi, A.K.M. Arifur **51**(6) 317
 Rad, A. Shokuhi **51**(4) 191
 Rafi, Muhammad Ather **51**(6) 329
 Rahman, Atiq-ur **51**(4) 212
 Rahman, M. S. **51**(2) 89
 Refai, Heba A. El **51**(5) 245
 Rehman, H. **51**(1) 19
 Rehman, Salma **51**(1) 24
 Rehman, Zakir-ur **51**(4) 212
 Sabri, Mohammad Usman **51**(2) 72
 Saeed, Sheikh Arshad **51**(1) 52
 Sahoo, Sunit Kumar **51**(4) 201
 Saleem Mohammad **51**(1) 24
 Saleem, Ashiq **51**(2) 103
 Saleem, Muhammad **51**(3) 147
 Saleem, Muhammad **51**(4) 177
 Saleem, Muhammad **51**(4) 212
 Saleem, Rubina **51**(3) 136
 Salim, M. **51**(1) 31
 Shaban, M. E. **51**(3) 119
 Shafi, Nusrat **51**(5) 250
 Shah, Asad Naeem **51**(6) 293
 Shahzad, A. **51**(2) 98
 Shaikh, Shagufta A. **51**(4) 185
 Shaikh, Shagufta Ambreen **51**(5) 272
 Shakila Begum **51**(6) 301
 Shamsuzzaman, Md. **51**(1) 1
 Shanta, I. S. **51**(5) 267
 Sharif, Qazi **51**(6) 301
 Siddique, Kauser **51**(1) 24
 Siddique, M. **51**(5) 250

Siddiqui, Ishratullah **51**(4) 220
Siddiqui, Kauser **51**(5) 242
Sohaib, Mohammad **51**(3) 131
Sohail, Tehmina **51**(3) 136
Sohail, Tehmina **51**(4) 212
Suleman, Muhammad **51**(2) 107
Sultana, Liaquat **51**(4) 185
Sultana, Liaquat **51**(5) 272
Syed, Quratulain **51**(3) 150
Talukder, F.A. **51**(6) 309
Veesar, N. F. **51**(4) 216
Venil, C.K. **51**(6) 333
Waheed, Amran **51**(3) 147
Waqar, Muhammad Anwar **51**(1) 52

Waqar, Muhammad Atif **51**(1) 52
Yaqeen, Zahra **51**(3) 136
Yaqeen, Zahra **51**(4) 212
Yaqub, Azra **51**(3) 131
Yaqub, Azra **51**(5) 254
Yousaf, M. **51**(1) 26
Yousafzai, M. Asim **51**(3) 140
Youssef, A. M. **51**(3) 119
Yun-shan, G.E. **51**(6) 293
Zahid, M. Shafiq **51**(2) 103
Zaman, Badr-uz- **51**(1) 31
Zeb, Pir Aurang **51**(6) 301
Zhi-hua, Liu **51**(6) 293
Zia, Ahmed **51**(6) 329

Pak. J. Sci. Ind. Res. 2008, 51(1-6)
Subject Index

A comprehensive systematic pharmacological review on <i>Harpagophytum procumbens</i> DC. (Devil's claw).	51(3)165
A list of damselflies (Zygoptera: Odonata) recorded from Azad Jammu and Kashmir (AJ&K), Pakistan.	51(6)329
<i>Abelmoschus esculentus</i> (l) moench stored at different relative humidities. Comparative study of quality changes in Okra	51(6)304
agroresidues used in solid substrate fermentation for alpha-amylase production by <i>Bacillus subtilis</i> -239. Different	51(1)26
alkaline protease production by <i>Bacillus licheniformis</i> N-2 and compatibility studies with commercial detergents. Stimulatory effect of medium ingredients on	51(3)150
alpha amylase production by <i>Serratia marcescens</i> SB08. Response surface methodology for the optimization of	51(6)333
alpha-1, 4-glucosidase (maltase) from baker's yeast (<i>Saccharomyces cerevisiae</i>). Phylogenetic and computational structure-function studies of	51(4)185
alpha-amylase production by <i>Bacillus subtilis</i> -239. Different agroresidues used in solid substrate fermentation for	51(1)26
amylase activity of pancreatin obtained from bovine pancreas. Studies on	51(5)242
An experimental investigation of PAH emissions from a heavy duty diesel engine fuelled with biodiesel and its blend.	51(6)293
<i>Anaphe infracta</i> larvae. Proximate composition, nutritionally valuable minerals and the effects of some salts on the functional properties of silkworm	51(2)77
Antidiarrhoeal evaluation of some Nigerian medicinal plants used in Bini traditional folk medicine.	51(3)158
antiemetic activities of alcoholic extract of <i>Grewia asiatica</i> in experimental model dog. Evaluation of	51(4)212
Antifungal activity of the liquid obtained by oxidative cracking of waste paper.	51(5)264
antimicrobial agents. Synthesis of some 2-methyl-3-(arylthiocarbamido) quinazol-4-ones and 2-methyl-3-(Arylidencarboxamido) quinazol-4-ones as potential	51(3)124
Antioxidants. Sesquiterpenes: the potent	51(6)343
Applications of lac dye using different mordants on leather.	51(5)254
arachidonic acid metabolism in the human fetus and the neonate. Regulation of	51(1)52
arsenic in urine, hair and nails through contaminated drinking water in Pakistan. Occurrence and severity of	51(4)220
<i>Aspergillus terreus</i> Thom. Molecular and biochemical evaluation of genetic effects of <i>Calotropis procera</i> (ait.) Latex on	51(4)206
Assessment of groundwater recharge in semi-arid region of Northern Nigeria.	51(2)86
Azad Jammu and Kashmir (AJ&K), Pakistan. A list of damselflies (Zygoptera: Odonata) recorded from	51(6)329
<i>Bacillus licheniformis</i> N-2 and compatibility studies with commercial detergents. Stimulatory effect of medium ingredients on alkaline protease production by	51(3)150
<i>Bacillus subtilis</i> -239. Different agroresidues used in solid substrate fermentation for alpha-amylase production by	51(1)26

baker's yeast (<i>Saccharomyces cerevisiae</i>). Phylogenetic and computational structure-function studies of alpha-1, 4-glucosidase (maltase) from	51(4)185
Bangladesh. Geotechnical study of sub-surface sediments in Sirajgonj town and its adjoining areas,	51(1)1
barani and minor irrigated conditions. Performance of newly released dry land wheat varieties under	51(2)107
barind clay formation in Bangladesh: a comparative study. Origin of opal-CT in lower eocene tallahatta formation, Mississippi, USA and pleistocene	51(2)61
Beneficiation of Malakand graphite ore.	51(6)340
Beneficiation studies on low-grade stibnite ore of Chitral, NWFP, Pakistan.	51(1)45
benzoxazin-4-one and quinazolin-4-one. Synthesis and reactions of some new substituted	51(3)119
Bini traditional folk medicine. Antidiarrhoeal evaluation of some Nigerian medicinal plants used in	51(3)158
Biodiesel and its blend. An experimental investigation of PAH emissions from a heavy duty diesel engine fuelled with	51(6)293
biosorbent for removal of reactive, acid and disperse dyes from aqueous solutions. Peanut hull as	51(1)19
<i>Brassica</i> species under water stress conditions. Growth response and ionic relation in two	51(1)31
<i>Brucella abortus</i> Biotype 1 in Sprague-Dawley rats. Transplacentally transmitted congenital brucellosis due to	51(2)89
brucellosis due to <i>Brucella abortus</i> Biotype 1 in Sprague-Dawley rats. Transplacentally transmitted congenital	51(2)89
bupirone hydrochloride in pure and pharmaceutical formulations by spectrophotometric method. Quantization of	51(2)72
<i>Calotropis procera</i> (ait.) latex on <i>Aspergillus terreus</i> Thom. Molecular and biochemical evaluation of genetic effects of	51(4)206
<i>Carthamus tinctorius</i> L. seed oil cultivated in Pakistan. Quantitation of fatty acids by GLC and separation of omega-6 nutraceutical fatty acid from	51(3)136
catfish <i>Clarias gariepinus</i> (Burchell, 1822) exposed to sublethal concentrations of Portland cement powder in solution. The concentration of electrolyte reserves of the juvenile african	51(6)323
<i>Catla catla</i> . Proximate composition of head of wild and farmed	51(3)163
Chemical variability of fatty acid composition of seabuckthorn berries oil from different locations by GC-FID.	51(5)250
Chitral, NWFP, Pakistan. Beneficiation studies on low-grade stibnite ore of	51(1)45
<i>Cicer arietinum</i> (white gram) and <i>Vigna mungo</i> (black gram) oils. Effect of microwave and sand roasting on physicochemical values and fatty acids of	51(1)15
ciprofloxacin hydrochloride floating oral delivery system. Preparation and evaluation of	51(4)201
citric acid production. Metabolic inhibitors as stimulating factors for	51(5)245
<i>Clarias gariepinus</i> (Burchell, 1822) exposed to sublethal concentrations of Portland cement powder in solution. The concentration of electrolyte reserves of the juvenile African catfish	51(6)323

Coleoptera: Curculionidae. Potential industrial uses and quality of oil of palm weevil, <i>Rhynchophorus phoenicis</i> F.	51(2)93
colour fastness of cotton, woolen and silk fabrics dyed with walnut bark dye. Relative study of the	51(3)131
Comparative study of quality changes in Okra <i>Abelmoschus esculentus</i> (L) Moench stored at different relative humidities.	51(6)304
Concentration of electrolyte reserves of the juvenile african catfish <i>Clarias gariepinus</i> (Burchell, 1822) exposed to sublethal concentrations of Portland cement powder in solution.	51(6)323
cosmetic multiple emulsion from olive oil. Formulation and <i>in vitro</i> evaluation of a	51(1)42
cotton, <i>Gossypium hirsutum</i> L. Estimates of genetic parameters from line x tester mating design for some quantitative traits in upland	51(1)36
cryoturbated chalk. The role of rainfall intensity and soil in determining rates of flow through	51(5)235
Curculionidae. Potential industrial uses and quality of oil of palm weevil, <i>Rhynchophorus phoenicis</i> F. Coleoptera:	51(2)93
damselflies (Zygoptera: Odonata) recorded from Azad Jammu and Kashmir (AJ&K), Pakistan. A list of	51(6)329
dental application. Steroid estimation in different	51(1)24
detergents. Stimulatory effect of medium ingredients on alkaline protease production by <i>Bacillus licheniformis</i> N-2 and compatibility studies with commercial	51(3)150
Determination of pesticide residue levels in Omani and UAE vegetable farm soils.	51(6)309
Determination of positional isomers of monoenoic fatty acids separated from seed oils of <i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> .	51(3)147
Development of an unconventional method to control the ectoparasites in backyard poultry.	51(5)267
Devil's claw. A comprehensive systematic pharmacological review on <i>Harpagophytum procumbens</i> DC.	51(3)165
Diesel engine fuelled with biodiesel and its blend. An experimental investigation of PAH emissions from a heavy duty	51(6)293
Different agroresidues used in solid substrate fermentation for alpha-amylase production by <i>Bacillus subtilis</i> -239.	51(1)26
drinking water in Pakistan. Occurrence and severity of arsenic in urine, hair and nails through contaminated	51(4)220
drinking water of Karachi City: microbiological quality. Surveillance of	51(5)272
drug interaction - a growing concern. Food and	51(4)225
dry land wheat varieties under barani and minor irrigated conditions. Performance of newly released	51(2)107
dye using different mordants on leather. Applications of lac	51(5)254
Dye. Relative study of the colour fastness of cotton, woolen and silk fabrics dyed with walnut bark	51(3)131
dyes from aqueous solutions. Peanut hull as biosorbent for removal of reactive, acid and disperse	51(1)19
ectoparasites in backyard poultry. Development of an unconventional method to control the	51(5)267

Effect of halopriming on sunflower seed germination and seedling establishment under saline environment.	51(2)98
Effect of microwave and sand roasting on physicochemical values and fatty acids of <i>Cicer arietinum</i> (white gram) and <i>Vigna mungo</i> (black gram) oils.	51(1)15
electrolyte reserves of the juvenile african catfish <i>Clarias gariepinus</i> (Burchell, 1822) exposed to sublethal concentrations of Portland cement powder in solution. The concentration of	51(6)323
emulsion from olive oil. Formulation and <i>in vitro</i> evaluation of a cosmetic multiple	51(1)42
eocene Tallahatta formation, Mississippi, USA and pleistocene barind clay formation in Bangladesh: a comparative study. Origin of opal-CT in lower	51(2)61
<i>Erythrococca anomala</i> , Benth. Some physical characteristics and nutritional composition of the seeds of wild pepper	51(3)128
Estimates of genetic parameters from line x tester mating design for some quantitative traits in upland cotton, <i>Gossypium hirsutum</i> L.	51(1)36
Evaluation of antiemetic activities of alcoholic extract of <i>Grewia asiatica</i> in experimental model dog.	51(4)212
fatty acid composition of seabuckthorn berries oil from different locations by GC-FID. Chemical variability of	51(5)250
fatty acids by GLC and separation of omega-6 nutraceutical fatty acid from <i>Carthamus tinctorius</i> L. seed oil cultivated in Pakistan. Quantitation of	51(3)136
fatty acids of <i>Cicer arietinum</i> (white gram) and <i>Vigna mungo</i> (black gram) oils. Effect of microwave and sand roasting on physicochemical values and	51(1)15
fetus and the neonate. Regulation of arachidonic acid metabolism in the human	51(1)52
fibre and earliness parameters in F ₂ progenies of intra-hirsutum crosses. Genetic analysis of	51(4)216
Fifty years of <i>Pakistan Journal of Scientific and Industrial Research</i> -an overview with reference to PCSIR Laboratories.	51(4)177
floating oral delivery system. Preparation and evaluation of ciprofloxacin hydrochloride	51(4)201
flow through cryoturbated chalk. The role of rainfall intensity and soil in determining rates of	51(5)235
fodder production under rainfed conditions of Pothohar tract. Performance of maize cultivars for	51(2)103
Food and drug interaction - a growing concern.	51(4)225
Formulation and <i>in vitro</i> evaluation of a cosmetic multiple emulsion from olive oil.	51(1)42
From chemistry to biology: furanic complexes as samples.	51(2)111
furanic complexes as samples. From chemistry to biology:	51(2)111
Genetic analysis of fibre and earliness parameters in F ₂ progenies of intra-hirsutum crosses.	51(4)216
genetic effects of <i>Calotropis procera</i> (ait.) Latex on <i>Aspergillus terreus</i> Thom. Molecular and biochemical evaluation of	51(4)206
genetic parameters from line x tester mating design for some quantitative traits in upland cotton, <i>Gossypium hirsutum</i> L. Estimates of	51(1)36
Geotechnical study of sub-surface sediments in Sirajgonj town and its adjoining areas, Bangladesh.	51(1)1

<i>Gossypium hirsutum</i> L. Estimates of genetic parameters from line x tester mating design for some quantitative traits in upland cotton,	51(1)36
graphite ore. Beneficiation of Malakand	51(6)340
<i>Grewia asiatica</i> in experimental model dog. Evaluation of antiemetic activities of alcoholic extract of	51(4)212
groundwater recharge in semi-arid region of Northern Nigeria. Assessment of	51(2)86
groundwaters from the Peshawar intermontane Basin, NWFP, Pakistan. Major ion chemistry of	51(3)140
Growth response and ionic relation in two <i>Brassica</i> species under water stress conditions.	51(1)31
halopriming on sunflower seed germination and seedling establishment under saline environment. Effect of	51(2)98
<i>Harpagophytum procumbens</i> DC. (Devil's claw). A comprehensive systematic pharmacological review on	51(3)165
Heavy duty diesel engine fuelled with biodiesel and its blend. An experimental investigation of PAH emissions from a	51(6)293
helminth infections in pigs. Prevalence and pathology of	51(6)317
<i>hirsutum</i> crosses. Genetic analysis of fibre and earliness parameters in F ₂ progenies of intra-	51(4)216
humidities. Comparative study of quality changes in okra <i>Abelmoschus esculentus</i> (L) Moench stored at different relative	51(6)304
intra- <i>hirsutum</i> crosses. Genetic analysis of fibre and earliness parameters in F ₂ progenies of	51(4)216
ion chemistry of groundwaters from the Peshawar intermontane Basin, NWFP, Pakistan. Major	51(3)140
ionic relation in two <i>Brassica</i> species under water stress conditions. Growth response and	51(1)31
irrigated conditions. Performance of newly released dry land wheat varieties under barani and minor	51(2)107
isomers of monoenoic fatty acids separated from seed oils of <i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> . Determination of positional	51(3)147
lac dye using different mordants on leather. Applications of	51(5)254
leather. Applications of lac dye using different mordants on	51(5)254
maize cultivars for fodder production under rainfed conditions of Pothohar tract. Performance of	51(2)103
Major ion chemistry of groundwaters from the Peshawar intermontane Basin, NWFP, Pakistan.	51(3)140
Malakand graphite ore. Beneficiation of	51(6)340
maltase from baker's yeast (<i>Saccharomyces cerevisiae</i>). Phylogenetic and computational structure-function studies of alpha-1, 4-glucosidase	51(4)185
medicinal plants used in Bini traditional folk medicine. Antidiarrhoeal evaluation of some Nigerian	51(3)158
Metabolic inhibitors as stimulating factors for citric acid production.	51(5)245

2-methyl-3-(arylthiocarbamido) quinazol-4-ones and 2-methyl-3-(Arylidencarboxamido) quinazol-4-ones as potential antimicrobial agents. Synthesis of some	51(3)124
methyl-3-(Arylidencarboxamido) quinazol-4-ones as potential antimicrobial agents. Synthesis of some 2-methyl-3-(arylthiocarbamido) quinazol-4-ones and 2-	51(3)124
microbiological quality. Surveillance of drinking water of Karachi City:	51(5)272
microwave and sand roasting on physicochemical values and fatty acids of <i>Cicer arietinum</i> (white gram) and <i>Vigna mungo</i> (black gram) oils. Effect of	51(1)15
minerals and the effects of some salts on the functional properties of silkworm (<i>Anaphe infracta</i>) larvae. Proximate composition, nutritionally valuable	51(2)77
Molecular and biochemical evaluation of genetic effects of <i>Calotropis procera</i> (ait.) latex on <i>Aspergillus terreus</i> Thom.	51(4)206
monoenoic fatty acids separated from seed oils of <i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> . Determination of positional isomers of	51(3)147
mungbean genotypes differing in salt tolerance. Respiration, quantum yield of photosynthesis and transpiration of two	51(5)276
Neonate. Regulation of arachidonic acid metabolism in the human fetus and the	51(1)52
<i>Nicotiana rustica</i> . Determination of positional isomers of monoenoic fatty acids separated from seed oils of <i>Nicotiana tabacum</i> L. and	51(3)147
<i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> . Determination of positional isomers of monoenoic fatty acids separated from seed oils of	51(3)147
Nigeria. Assessment of groundwater recharge in semi-arid region of northern	51(2)86
Nigerian medicinal plants used in Bini traditional folk medicine. Antidiarrhoeal evaluation of some	51(3)158
Occurrence and severity of arsenic in urine, hair and nails through contaminated drinking water in Pakistan.	51(4)220
Odonata recorded from Azad Jammu and Kashmir (AJ&K), Pakistan. A list of damselflies Zygoptera:	51(6)329
oil from different locations by GC-FID. Chemical variability of fatty acid composition of seabuckthorn berries	51(5)250
oil of palm weevil, <i>Rhynchophorus phoenicis</i> F. (Coleoptera: Curculionidae). Potential industrial uses and quality of	51(2)93
olive oil. Formulation and <i>in vitro</i> evaluation of a cosmetic multiple emulsion from	51(1)42
Omani and UAE vegetable farm soils. Determination of pesticide residue levels in	51(6)309
omega-6 nutraceutical fatty acid from <i>Carthamus tinctorius</i> L. seed oil cultivated in Pakistan. Quantitation of fatty acids by GLC and separation of	51(3)136
opal-CT in lower eocene tallahatta formation, Mississippi, USA and pleistocene barind clay formation in Bangladesh: a comparative study. Origin of	51(2)61
Origin of opal-CT in lower eocene tallahatta formation, Mississippi, USA and pleistocene barind clay formation in Bangladesh: a comparative study.	51(2)61
oxidative cracking of waste paper. Antifungal activity of the liquid obtained by	51(5)264
PAH emissions from a heavy duty diesel engine fuelled with biodiesel and its blend. An experimental investigation of	51(6)293

<i>Pakistan Journal of Scientific and Industrial Research</i> -an overview with reference to PCSIR Laboratories. Fifty years of	51(4)177
Pakistan. A list of damselflies (Zygoptera: Odonata) recorded from Azad Jammu and Kashmir (AJ&K).	51(6)329
Pakistan. Pesticide immunoassays: experience and future perspective in	51(5)281
pancreas. Studies on amylase activity of pancreatin obtained from bovine	51(5)242
pancreatin obtained from bovine pancreas. Studies on amylase activity of	51(5)242
paper. Antifungal activity of the liquid obtained by oxidative cracking of waste	51(5)264
pathology of helminth infections in pigs. Prevalence and	51(6)317
PCSIR Laboratories. Fifty years of <i>Pakistan Journal of Scientific and Industrial Research</i> -an overview with reference to	51(4)177
Peanut hull as biosorbent for removal of reactive, acid and disperse dyes from aqueous solutions.	51(1)19
3', 4', 5, 6, 7-pentamethoxy-8-C-prenylflavone. Synthesis of	51(1)11
Performance of maize cultivars for fodder production under rainfed conditions of Pothohar tract.	51(2)103
Performance of newly released dry land wheat varieties under barani and minor irrigated conditions.	51(2)107
peroxo complexes of thorium (IV) containing organic acids and amine bases. Studies on the	51(2)65
Peshawar intermontane Basin, NWFP, Pakistan. Major ion chemistry of groundwaters from the	51(3)140
Pesticide immunoassays: experience and future perspective in Pakistan.	51(5)281
pesticide residue levels in Omani and UAE vegetable farm soils. Determination of	51(6)309
pharmaceutical formulations by spectrophotometric method. Quantization of buspirone hydrochloride in pure and	51(2)72
photosynthesis and transpiration of two mungbean genotypes differing in salt tolerance. Respiration, quantum yield of	51(5)276
Phylogenetic and computational structure-function studies of alpha-1, 4-glucosidase (maltase) from baker's yeast (<i>Saccharomyces cerevisiae</i>).	51(4)185
pleistocene barind clay formation in Bangladesh: a comparative study. Origin of opal-CT in lower eocene tallahatta formation, Mississippi, USA and	51(2)61
Polyurethanes. Study of structure and properties of thermoplastic	51(4)191
Portland cement powder in solution. The concentration of electrolyte reserves of the juvenile african catfish <i>Clarias gariepinus</i> (Burchell, 1822) exposed to sublethal concentrations of	51(6)323
Potential industrial uses and quality of oil of palm weevil, <i>Rhynchophorus phoenicis</i> F. (Coleoptera: Curculionidae).	51(2)93
Pothohar tract. Performance of maize cultivars for fodder production under rainfed conditions of	51(2)103
poultry. Development of an unconventional method to control the ectoparasites in backyard	51(5)267
prenylflavone. Synthesis of 3', 4', 5, 6, 7-pentamethoxy-8-C-	51(1)11

Preparation and evaluation of ciprofloxacin hydrochloride floating oral delivery system.	51(4)201
Prevalence and pathology of helminth infections in pigs.	51(6)317
Proximate composition of head of wild and farmed <i>Catla catla</i> .	51(3)163
Proximate composition, nutritionally valuable minerals and the effects of some salts on the functional properties of silkworm (<i>Anaphe infracta</i>) larvae.	51(2)77
Quantitation of fatty acids by GLC and separation of omega-6 nutraceutical fatty acid from <i>Carthamus tinctorius</i> L. seed oil cultivated in Pakistan.	51(3)136
Quantization of buspirone hydrochloride in pure and pharmaceutical formulations by spectrophotometric method.	51(2)72
quinazol-4-ones and 2-methyl-3-(Arylidencarboxamido) quinazol-4-ones as potential antimicrobial agents. Synthesis of some 2-methyl-3-(arylthiocarbamido)	51(3)124
quinazol-4-ones as potential antimicrobial agents. Synthesis of some 2-methyl-3-(arylthiocarbamido) quinazol-4-ones and 2-methyl-3-(arylidencarboxamido)	51(3)124
quinazolin-4-ones. Synthesis and reactions of some new substituted benzoxazin-4-one and	51(3)119
rainfall intensity and soil in determining rates of flow through cryoturbated chalk. The role of	51(5)235
rainfed conditions of Pothohar tract. Performance of maize cultivars for fodder production under	51(2)103
recharge in semi-arid region of northern Nigeria. Assessment of groundwater	51(2)86
Recovery of silver from x-ray washings.	51(6)301
Regulation of arachidonic acid metabolism in the human fetus and the neonate.	51(1)52
relative humidities. Comparative study of quality changes in okra <i>Abelmoschus esculentus</i> (L) Moench stored at different	51(6)304
Relative study of the colour fastness of cotton, woolen and silk fabrics dyed with walnut bark dye.	51(3)131
Respiration, quantum yield of photosynthesis and transpiration of two mungbean genotypes differing in salt tolerance.	51(5)276
Response surface methodology for the optimization of alpha amylase production by <i>Serratia marcescens</i> SB08.	51(6)333
<i>Rhynchophorus phoenicis</i> F. (Coleoptera: Curculionidae). Potential industrial uses and quality of oil of palm weevil,	51(2)93
roasting on physicochemical values and fatty acids of <i>Cicer arietinum</i> (white gram) and <i>Vigna mungo</i> (black gram) oils. Effect of microwave and sand	51(1)15
Role of rainfall intensity and soil in determining rates of flow through cryoturbated chalk.	51(5)235
<i>Saccharomyces cerevisiae</i> . Phylogenetic and computational structure-function studies of alpha-1, 4-glucosidase (maltase) from baker's yeast	51(4)185
saline environment. Effect of halopriming on sunflower seed germination and seedling establishment under	51(2)98
salt tolerance. Respiration, quantum yield of photosynthesis and transpiration of two mungbean genotypes differing in	51(5)276
salts on the functional properties of silkworm (<i>Anaphe infracta</i>) larvae. Proximate composition, nutritionally valuable minerals and the effects of some	51(2)77

seabuckthorn berries oil from different locations by GC-FID. Chemical variability of fatty acid composition of	51(5)250
sediments in Sirajgonj town and its adjoining areas, Bangladesh. Geotechnical study of sub-surface	51(1)1
seed oils of <i>Nicotiana tabacum</i> L. and <i>Nicotiana rustica</i> . Determination of positional isomers of monoenoic fatty acids separated from	51(3)147
seeds of wild pepper (<i>Erythrococca anomala</i> , Benth). Some physical characteristics and nutritional composition of the	51(3)128
<i>Serratia marcescens</i> SB08. Response surface methodology for the optimization of alpha amylase production by	51(6)333
Sesquiterpenes: the potent antioxidants.	51(6)343
silkworm (<i>Anaphe infracta</i>) larvae. Proximate composition, nutritionally valuable minerals and the effects of some salts on the functional properties of	51(2)77
silver from x-ray washings. Recovery of	51(6)301
sludge treatment options. Studies on textile	51(5)258
soil in determining rates of flow through cryoturbated chalk. The role of rainfall intensity and	51(5)235
soils. Determination of pesticide residue levels in Omani and UAE vegetable farm	51(6)309
solid substrate fermentation for alpha-amylase production by <i>Bacillus subtilis</i> -239. Different agroresidues used in	51(1)26
Some physical characteristics and nutritional composition of the seeds of wild pepper (<i>Erythrococca anomala</i> , Benth).	51(3)128
Steroid estimation in different dental applications.	51(1)24
stibnite ore of Chitral, NWFP, Pakistan. Beneficiation studies on low-grade	51(1)45
Stimulatory effect of medium ingredients on alkaline protease production by <i>Bacillus licheniformis</i> N-2 and compatibility studies with commercial detergents.	51(3)150
Studies on amylase activity of pancreatin obtained from bovine pancreas.	51(5)242
Studies on textile sludge treatment options.	51(5)258
Studies on the peroxo complexes of thorium (IV) containing organic acids and amine bases.	51(2)65
Study of structure and properties of thermoplastic polyurethanes.	51(4)191
sub-surface sediments in Sirajgonj town and its adjoining areas, Bangladesh. Geotechnical study of	51(1)1
sunflower seed germination and seedling establishment under saline environment. Effect of halopriming on	51(2)98
Surveillance of drinking water of Karachi City: microbiological quality.	51(5)272
Synthesis and reactions of some new substituted benzoxazin-4-one and quinazolin-4-one.	51(3)119
Synthesis of 3', 4', 5, 6, 7-pentamethoxy-8-C-prenylflavone.	51(1)11
Synthesis of some 2-methyl-3-(arylthiocarbamido) quinazol-4-ones and 2-methyl-3-(Arylidencarboxamido) quinazol-4-ones as potential antimicrobial agents.	51(3)124
Tallahatta formation, Mississippi, USA and pleistocene barind clay formation in Bangladesh: a comparative study. Origin of opal-CT in lower eocene	51(2)61

textile sludge treatment options. Studies on	51(5)258
thermoplastic polyurethanes. Study of structure and properties of	51(4)191
thorium (IV) containing organic acids and amine bases. Studies on the peroxo complexes of traditional folk medicine. Antidiarrhoeal evaluation of some Nigerian medicinal plants used in Bini	51(2)65
transpiration of two mungbean genotypes differing in salt tolerance. Respiration, quantum yield of photosynthesis and	51(3)158
Transplacentally transmitted congenital brucellosis due to <i>Brucella abortus</i> Biotype 1 in Sprague-Dawley rats.	51(5)276
UAE vegetable farm soils. Determination of pesticide residue levels in Omani and	51(2)89
<i>Vigna mungo</i> (black gram) oils. Effect of microwave and sand roasting on physicochemical values and fatty acids of <i>Cicer arietinum</i> (white gram) and	51(6)309
walnut bark dye. Relative study of the colour fastness of cotton, woolen and silk fabrics dyed with	51(1)15
waste paper. Antifungal activity of the liquid obtained by oxidative cracking of	51(3)131
water of Karachi City: microbiological quality. Surveillance of drinking	51(5)264
water stress conditions. Growth response and ionic relation in two <i>Brassica</i> species under	51(5)272
wheat varieties under barani and minor irrigated conditions. Performance of newly released dry land	51(1)31
wild pepper (<i>Erythrococca anomala</i> , Benth). Some physical characteristics and nutritional composition of the seeds of	51(2)107
X-ray washings. Recovery of silver from	51(3)128
Zygotera: Odonata recorded from Azad Jammu and Kashmir (AJ&K), Pakistan. A list of damselflies.	51(6)301
	51(6)329