Pakistan Journal of Scientific and Industrial Research

Vol. 52, No. 4 **Contents** **July - August 2009**

Physical Sciences

Biological Sciences

Technology

Physical Sciences

Pak. J. Sci. Ind. Res. 2009 **52** (4) 173-179

Solvent Extraction of Zn(II) from Aqueous Sulphate Media by Di(2-Ethylhexyl) Phosphoric Acid in Kerosene

D. A. Begum, M. Alauddin, M. F. Islam and M. S. Rahman*

Department of Applied Chemistry and Chemical Technology, University of Rajshahi, Rajshahi - 6205, Bangladesh

(received October 27, 2008; revised June 18, 2009; accepted June 30, 2009)

Abstract. The extraction equilibrium studies of Zn(II) from sulphate medium by di(2-ethylhexyl) phosphoric acid (D2EHPA, H_2A_2) in kerosene revealed that the distribution ratio (D) decreased with the increase of initial [Zn(II)] in the aqueous phase and increased with the increase of equilibrium pH and extractant concentration. The equilibration is reached within 2 min. The species extracted into the organic phase is thought to be ZnA_2.HA. The pH and extractant dependencies were about 2 and 1.67, respectively. The distribution ratio decreased with the increase in sulphate ion concentration in the aqueous phase. The extraction equilibrium reaction is suggested as $Zn^{2+}_{aq} + 1.5\ (H_2A_2)_{org} \leftrightarrow [ZnA_2.HA]_{org} + 2H^+_{aq}$. The extraction equilibrium constant (k_{ex}) for the above reaction was calculated to be $10^{-2.26}$. The extraction process was endothermic in nature having positive D*H* value of 16.27 kJ/mol. The loading of D2EHPA by Zn(II) is about 4.50 g of Zn(II) by 0.10 M D2EHPA. Possible reaction mechanism has been suggested based on distribution data, extractant concentration and equilibrium pH of the aqueous phase.

Keywords: solvent extraction, Zn(II) ion, sulphate media, D2EHPA, di(2-ethylhexyl) phosphoric acid, kerosene

Pak. J. Sci. Ind. Res. 2009 **52** (4) 180-185

Synthesis, Characterization and Antimicrobial Evaluation of Some Arylidenehydrazonofuropyrimidines and Thienopyrimidines

Md. Mosharef Hossain Bhuiyan*, Khandker M. M. Rahman and Md. Imjamul Islam

Department of Chemistry, University of Chittagong, Chittagong-4331, Bangladesh

(received March 30, 2009; revised June 1, 2009; accepted June 5, 2009)

Abstract. Cyclization of heteroaromatic *o*-aminoester with formamide afforded furo[2,3-d]pyrimidin-4(3*H*)-one which was then chlorinated with thionyl chloride followed by displacement by hydrazine hydrate to furnish hydrazinofuro [2,3-d]pyrimidine. Reaction of hydrazino derivative with formic acid gave furo[3,2-e][1,2,4]triazolo[4,3-c]pyrimidine. Treatment of hydrazino derivative with aromatic aldehydes afforded arylidenehydrazonofuro[2,3-d]pyrimidine derivatives. Reaction of *o*-aminonitrile with carbon disulphide, followed by methylation with methyl iodide and subsequent reaction with hydrazine hydrate afforded hydrazinothieno[2,3-d]pyrimidine. 14 derivatives were synthesized. Some of these derivatives exhibited pronounced antimicrobial activities against *S. typhi, S. aureus, S. dysenteriae, V. cholerae, C. lunata, A. alternata, C. corchori, F. equeseti* and *M. phaseolina*.

Keywords: aminoester, aminonitrile, furo-pyrimidine, thieno-pyrimidine, antimicrobial activity, pyrimidines

Pak. J. Sci. Ind. Res. 2009 **52** (4) 186-190

In vitro Analysis and Data Comparison of Market Brands of Ciprofloxacin, Ofloxacin and Levofloxacin

Muhammad Zaheer*, Salma Rahman, Shahid Mahmood and Muhammad Saleem
Applied Chemistry Research Centre, PCSIR Laboratories Complex, Shahrah-e-Jalaluddin Romi, Lahore-54600, Pakistan

(received December 3, 2008; revised June 22, 2009; accepted June 30, 2009)

Abstract. In the evaluation of three different groups of 12 brands of locally manufactured Quinolone tablets available in the market i.e. ciprofloxacin HCl, ofloxacin and levofloxacin hemihydrate, it was found that composition of active ingredients were within the range of pharmacoepial limits but their disintegration time and rate of dissolution were different, some being very close to the lower pharmacoepial limit. One product was substandard having high disintegration time and very low rate of dissolution.

Keywords: flouroquinolone, ciprofloxacin, ofloxacin, levofloxacin

Biological Sciences

Pak. J. Sci. Ind. Res. 2009 **52** (4) 191-199

Purification and Characterization of Bacteriocin Like Substance Produced from *Bacillus lentus* with Perspective of a New Biopreservative for Food Preservation

Nivedita Sharma*, Ambika Attri and Neha Gautam
Department of Basic Sciences, Microbiology Research Laboratory, Dr. Y.S. Parmar Univerisy of Horticulture and Forestry, Nauni-Solan (H.P.) 173 230, India

(received January 24, 2009; revised June 8, 2009; accepted June 16, 2009)

Abstract. Molecular weight of bacteriocin like substance (BLIS) of a new strain of *Bacillus lentus* 121 was found to be approximately 11 kDa. Purification of BLIS was attained by single step gel exclusion chromatography. BLIS was characterized by studying the inhibitory spectrum. It was active at broad pH range, high temperature and high NaCl concentration and showed sensitivity to proteolytic enzymes like trypsin, α-chymotrypsin and papain, the characters desirable for food preservation. BLIS extended the shelf stability of milk upto 21 days as a biopreservative.

Keywords: bacteriocin like inhibitory substance, BLIS, *B. lentus*, antimicrobial activity, biopreservative

Pak. J. Sci. Ind. Res. 2009 **52** (4) 200-207

Karyomorphological and Morphometric Studies of Ploidy Levels in Some Wheat (*Triticum aestivum* L.) Genotypes

E. A. Kamel*[a], A. Arminian[b] and S. Houshmand[b]

[a]Department of Biological Sciences and Geology, Faculty of Education, Ain Shams University, P.C. 11341, Roxy, Cairo, Egypt
[b]Department of Crop Production, Faculty of Agriculture, Shahrekord University, P.O. Box 115, Shahrekord, Iran

(received September 2, 2008; accepted June 15, 2009)

Abstract. Karyomorphological and morphometric investigations of different ploidy levels of 14 genotypes of *Triticum aestivum* L. and one genotype of *Triticum durum* Desf. showed that, total chromosomal length (TCL) varied between genotypes. The highest value (56.21 μm) was recorded with mean chromosomal length of 8.03 ± 0.81 μm, while the lowest value of TCL (31.65 μm) was found with mean chromosomal length (MCL) of 4.52 ± 0.41 μm. Simple Pearson correlation coefficient (r) between TCL and MCL was the highest (r = 1.0 and P = 0.000). While the correlation coefficients between mean arm ratio (MAR) and parameters: total form (TF), intrachromosomal asymmetry index (A_1) and m (karyotype; metacentric region chromosome) as well as the coefficients between TF and m and between A_1 and m were the only significant (P<0.01) ones. Intrachromosomal asymmetry had a significant (P = 0.000) effect of total form percent than interchomosomal index. TCL and MCL were the most important karyological features influencing the principal component analysis and had 81.7 % variation, while in combination with MAR revealed 94% variation. Cluster dendrogram revealed close association and adjacent phylogenetic relatedness of tri- and hexaploid and also tetra- and hexaploid genotypes.

Keywords: cluster analysis, karyotype features, principal component analysis, wheat (*Triticum aestivum* L.), genotypes

Pak. J. Sci. Ind. Res. 2009 **52** (4) 208-216

Ameliorative Effect of Ethanolic Extract of *Cichorium intybus* on Cisplatin - Induced Nephrotoxicity in Rats

Shafaq Noori and Tabassum Mahboob*

Department of Biochemistry, Clinical Biophysics Research Unit, University of Karachi, Karachi - 75270, Pakistan

(received February 24, 2009; revised April 28, 2009; accepted June 05, 2009)

Abstract. In the study of the possible ameliorative effect of the *Cichorium intybus vs*. cisplatin-induced nephrotoxicity, no sign of toxicity was observed in rats on administration of ethanolic extract of *C. intybus* (500 mg/kg) with cisplatin (3 mg/kg). Oral administration of *C. intybus* extract reduced cisplatin-induced nephrotoxicity and also prevented elevated plasma creatinine, urea and nitrate, plasma and tissue MDA levels and restored antioxidant enzymes.

Keywords: cisplatin, *Cichorium intybus*, nephrotoxicity, antioxidant enzymes

Technology

Pak. J. Sci. Ind. Res. 2009 **52** (4) 217-227

Effects of Biodiesel from Soybean Oil on the Exhaust Emissions of a Turbocharged Diesel Engine

Asad Naeem Shah[ab]*, G. E. Yun-shan[a], TAN Jian-wei[a] and He Chao[c]

[a]School of Mechanical and Vehicular Engineering, Beijing Institute of Technology, Beijing 100081, P.R. China
[b]Department of Mechanical Engineering, University of Engineering and Technology, Lahore 54000, Pakistan
[c]School of Transportation, Mechanical and Civil Engineering, Southwest Forestry College, Kunming, 650224, P.R. China

(received August 23, 2008; revised June 2, 2009; accepted June 8, 2009)

Abstract. This paper presents the regulated emissions in the light of cylinder pressure and heat release rate (HRR) from a 4-stroke direct injection (DI) diesel engine fuelled with neat soybean oil-based biodiesel, commercial diesel and 20% biodiesel-diesel blend. The engine was run using electrical dynamometer at four different engine conditions. The experimental results revealed that brake power (BP) of the engine decreased but brake specific fuel consumption (BSFC) increased with biodiesel as compared to diesel. Relative to diesel, the maximum combustion pressure (MCP) was higher; however, HRR curves were not much deeper in the ignition delay (ID) periods and the premixed combustion peaks were lower with biodiesel. Carbon monoxide (CO), total hydrocarbons (HC), smoke opacity, and particulate matter (PM) emissions decreased by 3% to 14%, 32.6% to 46%, 56.5% to 83%, and 71% to 87.8%, respectively; however, oxides of nitrogen (NO_x) increased by 2% to 10% with biodiesel, compared to the commercial diesel. Both smoke and NO_x pollutants were greatly influenced by the MCP. CO, HC, and PM emissions were higher at lower load conditions compared to higher load conditions, but NO_x and smoke pollutants were higher at higher load conditions relative to lower load conditions.

Keywords: diesel engine, direct injection, biodiesel, heat release rate, regulated emissions

Pak. J. Sci. Ind. Res. 2009 **52** (4) 228-230

Development of a Solar Fish Dryer

Adenike Boyo[a]* and Henry Boyo[b]

[a]Physics Department, Lagos State University, Ojo, Lagos, Nigeria

[b]Physics Department, University of Lagos, Akoka, Lagos, Nigeria

(received June 11, 2008; revised March 13, 2009; accepted April 6, 2009)

Abstract. The solar fish dryer developed for particular conditions of Bishop Village, Lagos, Nigeria absorbs sunlight with a flat plate collector for its air heater. Mirrors are appended to one of the collector sides to enhance collection of solar radiations. The dryer is a passive type, tailored to solve the energy needs of the people of the area. On days of high irradiance, temperature within the solar fish dryer can be as high as 80°C with relative humidity around 10%.

Keywords: renewable energy, flat plate collector, solar fish dryer, fish drying