Pakistan Journal of Scientific and Industrial Research

Vol. 52, No. 3 **Contents** **May - June 2009**

Physical Sciences

Synthesis and Spectral Studies of Some Novel Coumarin Based Disperse Azo Dyes
Rana Amjad, Munawar Ali Munawar, Shahid Rehman Khan and Muhammad Naeem 117

Intercorrelation of Amino Acid Quality between Raw, Steeped and Germinated Pearl Millet *(Pennisetum typhoides)* Grains
Emmanuel Ilesanmi Adeyeye 122

Chemical and Amino Acid Composition of Cooked Walnut *(Juglans regia)* Flour
Henry Niyi Ogungbenle 130

Comparative Study of Heavy Metals in Selected Vegetables Collected from Different Sources
Khalid Iqbal, Tahira Shafiq and Kurshed Ahmed 134

Biological Sciences

Antimicrobial Screening of Some Derivatives of Methyl α-D-Glucopyranoside
Abul K. M. S. Kabir, Sarkar M. A. Kawsar, Mohammad M. R. Bhuiyan, Md. Safiqur Rahman and Mohammad E. Chowdhury 138

Antibacterial Activity of Some Commonly Used Food Commodities Against *Escherichia coli, Salmonella typhi* and *Staphylococcus aureus*
Anila Siddiqui, Asma Ansari and Seema Ismat Khan 143

Effect of Modified Water Chestnut *(Trapa bispinosa)* Starch on Physical and Sensory Properties of Sponge Cake
Zubala Lutfi and Abid Hasnain 146

Short Communication

Efficacy of Copxykil Against Some Pathogenic and Non-Pathogenic Microorganisms
Tahera Khatoon, Yazdana M. Rizki, Shahnaz Parveen and Muhammad Ishaq Qaimkhani 151

Technology

Quantification of Methotrexate by Liquid Chromatography Ultraviolet Detection for Routine Monitoring of Plasma Levels
Nadia Jebabli, Anis Klouz, Ridha Ben Ali, Emna Gaïes, Issam Salouage, Mohamed Lakhal and Chalbi Belkahia 154

Experimental Investigation of VOCs Emitted from a DI-CI Engine Fuelled with Biodiesel, Diesel and Biodiesel-Diesel Blend
Asad Naeem Shah, G. E. Yun-shan, Tan Jian-Wei and Liu Zhi-hua **158**

Noise Characteristics of Pumps at Tehran's Oil Refinery and Control Module Design
R. Golmohammadi, M. R. Monazzam, M. Nourollahi and A. Nezafat **167**

Physical Sciences

Pak. J. Sci. Ind. Res. 2009 **52**(3) 117-121

Synthesis and Spectral Studies of Some Novel Coumarin Based Disperse Azo Dyes

Rana Amjad[a]*, Munawar Ali Munawar[b], Shahid Rehman Khan[a] and Muhammad Naeem[a]

[a]Applied Chemistry Research Center, PCSIR Laboratories Complex, Lahore-54600, Pakistan
[b]Institute of Chemistry, University of the Punjab, Lahore, Pakistan

(received March 19, 2009; revised May 9, 2009; accepted May 26, 2009)

Abstract. Synthesis of some novel coumarin based azo dyes was carried out by diazotization of heterocyclic amines using nitrosyl sulphuric acid and then coupling them with 7-hydroxy-4-methyl Coumarin. The synthesized dyes when applied on polyester fibers showed moderate to good light fastness and very good to excellent fastness to washing, rubbing, perspiration and sublimation.

Keywords: disperse azo dyes, coumarin-based-azo dyes, heterocyclic amines

Pak. J. Sci. Ind. Res. 2009 **52**(3) 122-129

Intercorrelation of Amino Acid Quality between Raw, Steeped and Germinated Pearl Millet (*Pennisetum typhoides*) Grains

Emmanuel Ilesanmi Adeyeye*
Department of Chemistry, University of Ado-Ekiti, PMB 5363, Ado-Ekiti, Nigeria

(received November 6, 2008; revised May 27, 2009; accepted May 28, 2009)

Abstract. In the study of amino acids in the pearl millet grains, *Pennisetum typhoides*, steeped sample was best in Arg, Glu, Ser and protein contents, germinated sample was best in His, Lys, Met, Phe, Thr, Val, Ala, Asp, Cys (shared with raw sample), Pro and Tyr whereas raw sample was best in Ile, Leu and Gly. Total amino acid contents in steeped grains were 432 mg/g crude protein (c.p.), in germinated grain 464 mg/g c.p. and in raw grain 439 mg/g c.p. with respective essential amino acids of 210 mg/g c.p., 233 mg/g c.p. and 224 mg/g c.p. Percentage Cys/TSAA trend was 53.1 (raw) > 52.1 (germinated) > 51.2 (steeped). Predicted protein efficiency ratio (P-PER) levels were 1.32 (steeped), 1.66 (raw) and 1.57 (germinated). The Leu/Ile ratio levels were 2.22 (raw) and 2.46 (both steeped and germinated). Amino acid scores based on whole hen's egg had Met as the limiting amino acid for the three samples. The two treatments enhanced the quality of the pearl millet amino acid levels thereby providing high potentials for use in weaning foods and formulations. However, no significant difference was seen between raw/steeped, raw/germinated and steeped/germinated samples at $p < 0.05$.

Keywords: amino acid profile, *Pennisetum typhoides*, processed grains, pearl millet

Pak. J. Sci. Ind. Res. 2009 **52**(3) 130-133

Chemical and Amino Acid Composition of Cooked Walnut (*Juglans regia*) Flour

Henry Niyi Ogungbenle*
Department of Chemistry, University of Ado - Ekiti, Ado - Ekiti, Nigeria

(received March 3, 2008; revised March 14, 2009; accepted March 14, 2009)

Abstract. The proximate analysis of cooked walnut (*Juglans regia*) flour revealed the composition as protein (14.18%), moisture (11.01%), ash (3.14%), crude fibre (3.03%), crude fat (10.22%), carbohydrate (58.42%), phytate (20.18 mg/g), oxalate (1.13 g/g) and tannin (2.33%). Glutamic and aspartic acids were the most predominant amino acids in the sample with values of 151.6 mg/g and 89.5 mg/g, respectively.

Keywords: *Juglans regia*, nutritional composition, amino acids; antinutritional factors

Pak. J. Sci. Ind. Res. 2009 **52**(3) 134-137

Comparative Study of Heavy Metals in Selected Vegetables Collected from Different Sources

Khalid Iqbal[a]*, Tahira Shafiq and Khurshed Ahmed[b]

[a]Center for Environmental Protection Studies, PCSIR Laboratories Complex, Lahore - 54600, Pakistan

[b]National College of Business Administration and Economics, 40 E/1, Gulberg-III, Lahore, Pakistan

(received September 25, 2008; revised May 20, 2009; accepted May 27, 2009)

Abstract. In present study two types of vegetables, one irrigated with tap and other with sewage water, were analyzed with respect to heavy metals. The concentration of heavy metals was high in sewage, soil, and vegetables than in house source. All metals were not detected except iron (0.07 mg/l) in tap water. The accumulation of Cr in sewage ranged 0.1- 14.1 mg/kg that was maximum in Carrot and minimum in Reddish, while Cd was not detected in Carrot. The concentrations of Mn, Fe and Zn in sewage-irrigated vegetables were more than house holds samples.

Keywords: heavy metals, vegetables, sewage water

Biological Sciences

Pak. J. Sci. Ind. Res. 2009 **52**(3) 138-142

Antimicrobial Screening of Some Derivatives of Methyl α-D-Glucopyranoside

Abul K. M. S. Kabir[a]*, Sarkar M. A. Kawsar[a], Mohammad M. R. Bhuiyan[a], Md. Safiqur Rahman[b] and Mohammad E. Chowdhury[a]

[a]Department of Chemistry, University of Chittagong, Chittagong-433, Bangladesh

[b]Department of Microbiology, University of Chittagong, Chittagong-433, Bangladesh

(received August 30, 2008; revised March 14, 2009; accepted April 15, 2009)

Abstract. *In vitro* antimicrobial functionality test of methyl 4,6-*O*-cyclohexylidene-α-D-glucopyranoside and its twelve acylated derivatives against ten human pathogenic bacteria and six phytopathogenic fungi comparative to Ampicillin and Nystatin revealed the tested chemicals to possess moderate to good antibacterial and antifungal activity and to be more effective against fungal phytopathogens. Many of these chemicals exhibited better antimicrobial activity than the standard antibiotics. Minimum Inhibition Concentration (MIC) of methyl 4,6-*O*-cyclohexylidene-2-*O*-myristoyl-3-*O*-palmitoyl-α-D-glucopyranoside against *Bacillus cereus, Bacillus subtilis* and *Staphylococcus aureus* was 25, 12.5 and 25 μg/disc, respectively.

Keywords: antibacterial activities, antifungal activities, methyl glucopyranoside derivatives

Pak. J. Sci. Ind. Res. 2009 **52**(3) 143-145

Antibacterial Activity of Some Commonly Used Food Commodities Against *Escherichia coli, Salmonella typhi* and *Staphylococcus aureus*

Anila Siddiqui, Asma Ansari and Seema Ismat Khan*
PCSIR Laboratories Complex, Shahrah-e-Dr. Salimuzzaman Siddiqui, Karachi-75280, Pakistan

(received November 19, 2008; revised April 11, 2009; accepted May 6, 2009)

Abstract. The activity of commonly used spices and salt, sugar and pickles against *Escherichia coli*, *Salmonella typhi*, and *Staphylococcus aureus* was tested. The antibacterial activity was found to be in descending order like coriander>pickles>salt and sugar>clove>turmeric>black pepper>red chilli against *S. typhi* and garlic>clove>onion>ginger against *S. aureus.*

Keywords: spices, antibacterial activity, food commodities

Pak. J. Sci. Ind. Res. 2009 **52**(3) 146-150

Effect of Modified Water Chestnut *(Trapa bispinosa)* Starch on Physical and Sensory Properties of Sponge Cakes

Zubala Lutfi* and Abid Hasnain
Department of Food Science and Technology, University of Karachi, Karachi-75270, Pakistan

(received September 10, 2008; revised March 15, 2009; accepted March 25, 2009)

Abstract. Study of the effect of chemically and physically modified water chestnut (*Trapa bispinosa*) starch on volume index, symmetry index and uniformity index of sponge cake revealed that addition of acetylated starch (3%) increased the volume index of control sponge cake to a greater extent. In case of acid-thinned starch, increase in symmetry index was not very significant except that of concentration of 1%. At 4% - 5% concentration, pregelatinized starch and acid-thinned starch showed excellent uniformity index. Acetylated starch at 1% and 5% concentration significantly increased the grain structure.

Keywords: water chestnut starch, symmetry index of cakes, uniformity index of cakes, volume index of cakes, starch, cakes

Pak. J. Sci. Ind. Res. 2009 **52**(3) 151-153

Short Communication

Efficacy of Copxykil Against Some Pathogenic and Non-Pathogenic Microorganisms

Tahera Khatoon*, Yazdana M. Rizki, Shahnaz Parveen and Muhammad Ishaq Qaimkhani
PCSIR Laboratories Complex, Sharah-e-Dr. Salimuzzaman Siddiqui, Karachi-75280, Pakistan

(received January 26, 2008; revised November 19, 2008; accepted November 24, 2008)

Abstract. Efficacy of copxykil – with copper oxychloride as active ingredient – as fungicide and bactericide was evaluated against *Alternaria alternata*, *Fusarium oxysporum*, *F. solani*, *Aspergillus flavus*, *A. fumigatus*, *A. niger* and *Pencillium expansum* as well as against *Escherichia coli*, *Shigella dysentriae* and compared with a standard imported commercial product 'COBOX'. The test fungicide proved to be more effective than the commercial one.

Keywords: copxykil, fungicidal effect, bactericidal effect, copper oxychloride

Pak. J. Sci. Ind. Res. 2009 **52**(3) 154-157

Technology

Quantification of Methotrexate by Liquid Chromatography Ultraviolet Detection for Routine Monitoring of Plasma Levels

Nadia Jebabli*, Anis Klouz, Ridha Ben Ali, Emna Gaïes, Issam Salouage, Mohamed Lakhal and Chalbi Belkahia

Laboratory of Clinical Pharmacology, Centre National de Pharmacovigilance, Tunisia

(received January 12, 2009; revised March 5, 2009; accepted May 18, 2009)

Abstract. A high-performance liquid chromatographic (HPLC) technique with ultraviolet detection incorporating solid phase extraction (SPE) was developed to meet analytical and metrological requirements for routine serum level monitoring of methotrexate (MTX), with several parameters optimised such as temperature, flow rate, composition of the mobile phase and pH of the buffer solution. Two standard curves were constructed to cover the high and low levels of the calibrator range (0.02-600 µmol/litre). Reproducibility (precision) of the method for intra assay was 2.7; 2.10; 1.38% at the lowest level and 2.11; 3.4; 2.01% at the highest level and for inter assay was 2.8; 2.2; 2.94% at the lowest level and 2.4; 2.74; 2.68% at the highest level; recovery was between 90.47 and 98.53 percent. Response was found linear over the whole range of the calibrator set with a correlation coefficient of 0.999. The limit of quantification and the limit of detection were 0.02µmol/litre and 0.0063µmol/litre, respectively. The method is suitable for quantification of methotrexate with good accuracy and precision

Keywords: methotrexate, liquid chromatography, solid-phase extraction, plasma level monitoring

Pak. J. Sci. Ind. Res. 2009 **52**(3) 158-166

Experimental Investigation of VOCs Emitted from a DI-CI Engine Fuelled with Biodiesel, Diesel and Biodiesel-Diesel Blend

Asad Naeem Shah[ab]*, G. E. Yun-shan[a], Tan Jian-wei[a] and Liu Zhi-hua[a]

[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

(received November 6, 2008; revised March 25, 2009; accepted March 28, 2009)

Abstract: Experimental investigation of volatile organic compounds (VOCs) emitted by a turbocharged direct injection compression ignition (DI-CI) engine, alternatively fuelled with biodiesel and its 20% blend with diesel, revealed dominancy of diesel and biodiesel in aromatic hydrocarbons, esters other oxides, respectively, in total volatile organic compounds (TVOCs). The overall brake specific emission of VOCs increased at rated speed compared to maximum torque speed. The VOCs exhibited their maxima at low load, and minima at medium load for diesel and B100. Engines with a speed of 2300 r/min and 100% load showed a reduction in BTX emissions from B20 and B100, as compared to diesel. The sum of VOC-components of B20 and B100 reduced as compared to that of the diesel, for all the engine conditions. The mean BSE of BTX-components taken from all the engine conditions decreased with B20 and B100, relative to fossil diesel.

Keywords: compression ignition engine, biodiesel, unregulated emissions, volatile organic compounds

Pak. J. Sci. Ind. Res. 2009 **52**(3) 167-172

Noise Characteristics of Pumps at Tehran's Oil Refinery and Control Module Design

R. Golmohammadi[a], M. R. Monazzam[b]*, M. Nourollahi[a] and A. Nezafat[a]

[a]Occ. Hyg. Deptt., School of Public Health and Center for Health Research, Hamadan University of Medical Sciences, P.O. Box 4171, Hamadan, Iran

[b]Occ. Hyg. Deptt., School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

(received January 17, 2009; revised March 16, 2009; accepted March 17, 2009)

Abstract. Considering industrial excessive noise exposure, sound pressure level of 4 pumps with different applications installed in Isomax Unit of Oil Refinery Centre of Tehran, Iran was studied. The A-weighted sound pressure level and maximum sound pressure level showed that the emitted noise is far above the permissible limits. Installing enclosure around the noise source was found to be the best noise control measure. Results of operational calculating transmission loss of the designed module with a sandwich layer showed that it is possible to provide 19.7 dB (A) reduction in overall sound pressure level and 20 dB reduction in dominant frequency. Designing the module with given specifications and probable leak estimation and prevention gives remarkable and effective results in the studied field.

Keywords: pump noise, noise pollution, noise exposure