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# Electrochemical Reduction of 4-(3-Pyridylazo)-3-Amino-2-Pyrazolin-5-One

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(received May 28, 2004; revised August 25, 2005; accepted August 27, 2005)

**Abstract.** The electrochemical reduction of 4-(3-pyridylazo)-3-amino-2-pyrazolin-5-one in universal buffer solutions of different pH values was studied at 268 K. From the results obtained, it was concluded that the azo compound was reduced via an ECEC mechanism (two-electron and two-proton mechanism). The mechanism was confirmed by digital simulation. The heterogeneous electron transfer and homogeneous protonation follow-up reaction parameters were evaluated and the electrode mechanism is discussed.

**Keywords:** electrochemical reduction, ECEC mechanism, aminopyrazoline, 4-(3-pyridylazo)-3-amino-2-pyrazolin-5-one, cyclic voltammetry, azo compounds

Pak. J. Sci. Ind. Res. 2005 **48**(6) 377-380

# Catalytic Transfer Reduction of Electron Deficient Alkenes and an Imine Using Potassium Formate and Catalytic Palladium Acetate

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(received August 23, 2004; revised November 17, 2005; accepted November 18, 2005)

**Abstract.** Chemoselective reduction of α, β-unsaturated cyanostannyl esters, ketones and an imine with potassium formate as hydrogen donor and palladium acetate as homogeneous catalyst in DMF was observed to proceed readily with saturation of C-C and C-N double bonds, without any concomitant reduction of cyano, carboxylate, halogen or carbonyl groups and demetallation.

**Keywords:** catalytic transfer hydrogenation, potassium formate, palladium acetate, electron deficient alkenes, catalytic transfer, catalytic reduction, chemoselective hydrogenation, transition metal-hydrides

Pak. J. Sci. Ind. Res. 2005 **48**(6) 381-385

# Synthesis and Characterization of Dimethyltin(IV) Complex with 2-Methylpyridylbenzhydrazone (AcPyBzh): Crystal Structure of [$Me_2SnCl$ (AcPyBzh)]

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(received July 23, 2003; revised August 31, 2005; accepted September 1, 2005)

Pak. J. Sci. Ind. Res. 2005 **48**(6) 386-388

# Mass Fragmentation Pattern of Some Mono- and Di-Substituted Formamidines. Part-1. Mass Pattern of 1-Arylformamidines

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(received May 20, 2004; revised February 26, 2005; accepted March 31, 2005)

**Abstract.** Some 1-arylformamidines were prepared by the Raney nickel (W-2) desulphuration of some 1-arylthioureas in anhydrous boiling benzene medium. Mass fragmentation patterns of the products were ascertained from the mass spectral data.

**Keywords:** Raney nickel, thiourea, desulphuration, mass fragmentation, 1-arylformamidines, mass pattern, nickel sulphide

Pak. J. Sci. Ind. Res. 2005 **48**(6) 389-392

# Intramolecular Fatty Acids Distribution in the Triglycerides of *Hordeum vulgare*

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(received August 20, 2003; revised September 10, 2005; accepted September 13, 2005)

**Abstract.** Triglycerides of a local variety of *Hordeum vulgare*, 'jao-87,' were separated from the lipids by column chromatography, purified on plain thin layer chromatography plates, and then fractionated by silver nitrate impregnated thin layer chromatography. Fatty acids composition of these fractions was verified by gas chromatography after their methylation. The distribution of fatty acids, attached at α, α'- and β-positions of the triglycerides and their fractions, was determined by lipolytic hydrolysis and subsequent gas chromatographic analysis of the 2-monoglycerides. The β-position was usually occupied by oleic, linoleic and linolenic acids, depending upon the comparative high percentage of the respective fatty acid in that triglyceride fraction.

**Keywords:** lipids, fatty acids, triglycerides, barley, *Hordeum vulgare*

Pak. J. Sci. Ind. Res. 2005 **48**(6) 393-396

# A Comparative Study on the Determination of Fe in Groundwater by Different Methods

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(recieved March 11, 2004; revised September 24, 2005; accepted September 28, 2005)

**Abstract.** Three different experimental methods were used to analyse iron content in groundwater samples drawn from various spots of Mirzapur, a southeastern part of Rajshahi City, Bangladesh. These included UV-visible spectrophotometry, atomic absorption spectrophotometry, and titrimetric methods. As many as 20 water samples were collected from randomly selected domestic water supply tubewells throughout the area. Iron content was found to range between 0.052 - 5.890 ppm, 0.060 - 6.060 ppm, and 0.139 - 5.584 ppm by the spectrophotometric, atomic absorption spectrophotometric, and titrimetric methods, respectively. The values obtained with the three different methods were, fairly comparable and lie within the fringe of experimental deviations.

**Keywords:** drinking water, Fe determination, metal contamination, toxic effect, groundwater iron

Pak. J. Sci. Ind. Res. 2005 **48**(6) 397-401

# Concentration and Distribution of Some Heavy Metals in Urban Soils of Ibadan, Nigeria

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(received June 18, 2004; revised March 1, 2005; accepted March 15, 2005)

**Abstract.** Concentrations and distribution of seven heavy metals, namely, Pb, Cd, Zn, Cr, Co, Ni and Cu in the soil samples collected from 38 different sites from Ibadan Metropolis and its suburbs were investigated. The metals were extracted from the soil with $HNO_3$-$HClO_4$-HF combination for the elemental analysis using flame atomic absorption spectrophotometer. The results obtained for all locations indicated (μg $g^{-1}$ dry weight): Pb (150±143); Cd (4.2±4.4); Zn (213±213); Cr (131±96); Co (38±19); Ni (79±56); and Cu (40±36). Zonal average of metal concentrations indicated the highest metal load in the environment of the urban high traffic (UHT) zone followed by the refuse dump sites. Interelemental association in the UHT-zone showed significant correlation between the pairs Pb-Cd (r = 0.521), Pb-Cu (r=0.412), Zn-Cr (r = 0.603), Zn-Cu (r = 0.334), Ni-Cr (r = 0.749), Ni-Co (r =0.324), and Cd-Cu (r = 0.408).

**Keywords:** heavy metals, environment pollution, metal contamination, metal-polluted soil

Pak. J. Sci. Ind. Res. 2005 **48**(6) 402-406

# Effects of Physical and Chemical Treatments on the Enzymatic Activities of Rice Bran Lipases

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(received May 10, 2004; revised September 1, 2005; accepted October 25, 2005)

**Abstract.** The lipolytic activities of lipases lip-I, lip-II and lip-III, purified from rice bran variety Paijam, were investigated after physical and chemical treatments. The purified lipases had pH optima of 7.3-8.0 and temperature optima of 34-40 °C. The results indicated that lip-I was more stable than lip-II and lip-III. The lipases isolated from rice bran, variety Paijam, belong to the category of alkaline lipases. Bile salts were found to be weak activators for the activation of lipases, while maximum activities were obtained with deoxycholate. The activities of rice bran lipases were enhanced by the presence of $Ca^{++}$ upto certain concentrations, while EDTA application strongly inhibited the lipolytic activities. Rice bran lipases were more sensitive to the denaturing agent guanidine-HCl than urea. The presence of heavy metal ions, such as $Cu^{++}$, $Hg^{++}$, $Zn^{++}$, $Fe^{++}$, strongly inhibited activities of the lipases, while such metals as $Ba^{++}$, $Mg^{++}$ and $Mn^{++}$ slightly increased the activities of lipases.

**Keywords:** lipolytic activities, rice bran lipases, bile salts, olive oil, heavy metals, rice variety Paijam

Pak. J. Sci. Ind. Res. 2005 **48**(6) 407-411

# Rose Bengal and Mercaptoethanol Tests for the Diagnosis of *Brucella abortus* Biotype-1 Infection in Sprague-Dawley Rats

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(received March 26, 2005; revised September 12, 2005; accepted October 15, 2005)

**Abstract.** Rose Bengal test (RBT) and mercaptoethanol test (MET) were conducted for the diagnosis of *Brucella abortus* biotype-1 infection. For this purpose, female Sprague-Dawley (S-D) rats were subcutaneously infected at the dose rate of $1.0\times10^9$ colony forming unit suspension of *B. abortus* in physiological saline. The S-D rats were monitored at regular intervals using serological and bacteriological methods. The reciprocal antibody titer after the first week was 1: 800 with RBT, whereas it was 1: 400 with MET. The reciprocal antibody titer of 1: 25 through RBT and 1:100 through MET, respectively, were noted in infected rats of 24 weeks post-infection. Bacteremia was detected untill 24 weeks post-infection. RBT, using *B. abortus* strain S1119-3 whole cell antigen, appears to be a potential candidate, as a useful diagnostic method, for brucellosis detection in rats.

**Keywords:** brucellosis, *Brucella abortus* biotype-1, Sprague-Dawley rats, Rose Bengal test, mercaptoethanol test

Pak. J. Sci. Ind. Res. 2005 **48**(6) 412-416

# Prevalence of Onchocerciasis Syndrome in Ise-Orun Local Government Area of Ekiti State, Nigeria

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(received July 16, 2004; revised June 2, 2005; accepted June 15, 2005)

**Abstract.** Twenty seven towns and villages in the Ise-Orun local government area of Ekiti State, Nigeria are in the grip of onchocerciasis. Out of the 2045 subjects examined, 1131 (55.3% at 95% confidence interval- CI, 0.53-0.57) were found to be infected by the disease. The prevalence of onchocerciasis varied from one town or village to the other in the area of study. The peak prevalence (80.5% at 95% CI, 0.73-0.89) was recorded in the village Temidire. The people aged 50-59 years accounted for peak prevalence (72.0% at 95% CI, 0.63-0.81). Out of the total 2045 subjects examined, 51.0, 26.8,19.2 and 3.0% were, respectively, found to be suffering from craw-craw, leopard skin, nodules, and partial blindness.

**Keywords:** dermatology, onchocerciasis infection, *Onchocerca volvulus*, craw-craw disease, leopard skin disease

Pak. J. Sci. Ind. Res. 2005 **48**(6) 417-421

# Incorporation of Button Mushrooms in Pakistani Dishes

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(received February 21, 2005; revised October 13, 2005; accepted October 15, 2005)

**Abstract.** Button mushrooms (*Agaricus bisporus*) were incorporated into six table delicacies and six traditional Pakistani dishes. Protein content of the mushroom-fortified dishes increased from 8.44% to 67.50%. Organoleptic evaluations showed that all the mushroom-fortified table delicacies and traditional dishes showed significant improvement in their acceptability.

**Keywords:** button mushrooms, anti-nutritive factors, toxins and allergents, *Agaricus bisporus*, table delicacies, Pakistani dishes

Pak. J. Sci. Ind. Res. 2005 **48**(6) 422-425

# Seasonal Incidence and Extent of Damage Caused by Citrus Leaf Miner, *Phyllocnistis citrella* Stainton Infesting Lemon

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(received April 14, 2003; revised November 17, 2005; accepted November 23, 2005)

**Abstract.** The seasonal incidence and extent of damage caused by citrus leaf miner, *Phyllocnistis citrella* Stainton (Lepidoptera : Gracillariidae) were investigated during a styudy carried out in a citrus orchard at Faridpur, Bangladesh. The leaf miner was active throughout the year, and its incidence and extent of damage varied significantly in different months. It was observed that the trend of rising and falling of the pest level occurred twice in a year, with two peak populations in the months of April and September. The minimum incidence was found in January and July. The extent of damage in respect of percentage of leaf infestation, area of leaf infestation and the mine length per leaf were, respectively, 80%, 60% and 12.8 cm in April, and 64.9%, 50.06% and 10.4 cm in September. The environmental temperature and relative humidity of spring and autumn influenced the incidence of citrus leaf miner resulting in higher pest population and plant damage. The low environmental temperature in the winter months and excessive rainfall in the monsoon season adversely affected the pest in the field. The moderate environmental conditions of spring and autumn were, therefore, the most favourable periods for *P. citrella* in Bangladesh.

**Keywords:** *Phyllocnistis citrella*, citrus damage, citrus leaf miner, lemon infestation

Pak. J. Sci. Ind. Res. 2005 **48**(6) 426-429

# Chromate Coating of Zinc-Aluminum Plating on Mild Steel

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(received September 17, 2004; revised June 15, 2005; accepted September 9, 2005)

**Abstract.** The chromate coating on zinc-aluminum deposits has been studied. Zinc-aluminum deposition from non-cyanide bath was carried out at current density 3-3.5 A/dm$^2$, plating voltage ~ 1.25 V, temperature 18-20 $^o$C, for 15 min. The effect of aluminum chloride on the rest potentials of golden, colourless and non-chromated zinc-aluminum alloy deposits was observed. It was found that rest potential was slightly increased with the increase in the concentration of aluminum chloride, only in the case of golden chromating. The rest potential of colourless chromated zinc-aluminum deposits on mild steel were observed to have no correlation with aluminum chloride concentration. The abrasion resistance of colourless chromating was better than golden chromating.

**Keywords:** zinc-aluminum deposition, chromating, rest potential, chromate coating, mild steel chromating

Pak. J. Sci. Ind. Res. 2005 **48**(6) 430-432

## Short Communication

# Spectroscopic and Dyeing Characteristics of the Yellow Dye from *Morinda lucida* (Brimstone Tree)

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(received December 11, 2003; revised October 10, 2005; accepted October 15, 2005)

**Abstract.** The yellow dye obtained from *Morinda lucida* plant, yield 16.5%, melting point 108-110 °C, showed absorption in the visible range 400-450 nm. Four major functional groups were identified at $\lambda_{max}$ of 435 nm. The IR and $^{1}$H-NMR spectra exhibited absorptions consistent with a conjugated polyfunctional structure. The yellow morinda dye is tentatively proposed as 4-benzoyl-2-amino acetaldehyde. The pigment imparted its brilliant yellow hue on the dyed cellulosic yarn and fabric with moderate fastness ratings to washing, perspiration, hot-pressing, however, having poor stability to high energy radiation.

**Keywords:** brimstone tree, *Morinda lucida*, yellow hue, equilibrium dye uptake, initial modulus, yellow morinda dye

Pak. J. Sci. Ind. Res. 2005 **48**(6) 433-435

## Short Communication

# Analysis and Purification of Nkalagu (Nigeria) Limestone and Poultry Eggshells for the Production of Paint Grade Calcium Carbonate

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(received June 30, 2004; revised September 30, 2005; accepted October 3, 2005)

**Abstract.** The local limestone (Nkalagu, Nigeria) and poultry eggshells were collected and analysed using gravimetric and spectrophotometric methods. The parameters determined were: moisture content, loss on ignition, impure silica, combined oxides such as CaO, MgO, $Fe_2O_3$, $Na_2O$ and $K_2O$. The carbonate contents fell short of that required (> 95%) for paint manufacture. The non-carbonate matters, regarded as impurities, were removed or reduced by chemical processes, which involved acid digestion through carbonation of the resultant filtrates. The purified $CaCO_3$ grades from both these samples were compared with the commercially available grades. The purified grades showed improved whiting and fineness, indicating their usefulness for paints and other $CaCO_3$ applications.

**Keywords:** limestone, Nigeria (Nkalagu), poultry eggshells, calcium trioxocarbonate, gravimetric limestone analysis, spectrophotometric limestone analysis

Pak. J. Sci. Ind. Res. 2005 **48**(6) 436-447

# Fundamental Concepts and Mechanisms in the Metal Biosorption Technology for the Treatment of Industrial Wastewaters

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(received May 17, 2005; revised November 28, 2005; accepted November 30, 2005)

**Abstract.** The review deals with the need to treat industrial effluents before their discharge into open water bodies. The technical and economical problems associated with conventional water treatment procedures have been pointed out. Biosorption, as an alternative technology for metal remediation of wastewaters is discussed. A detailed description of the theoretical basis, fundamental concepts and mechanisms involved in the adsorption of metals has been given. The validity of biosorption data as determined by the fit on the mathematical models of Freundlich and Langmuir adsorption isotherms has been described. The ion exchange mechanism, its differences with the Langmuir adsorption isotherms mechanism, and the advantages of one mechanism over the other in understanding the concepts of the biosorption process have been considered.

**Keywords:** toxic metal remediation, effluent treatment, metal biosorption, Langmuir/Freundlich adsorption isotherms, ion exchange, biosorption technology

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