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Physical Sciences

Pak. J. Sci. Ind. Res. 2004 ***47*** *(4) 247-250*

Simulation of Cyclic Voltammogram of Ruthenocene

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Digital simulation of cyclic voltammogram of ruthenocene in benzonitrile suggests that electrooxidation of ruthenocene at platinum electrode involves a one-electron oxidation. The ruthenium cation presumably combines with ruthenocene in a fast following chemical reaction. The proposed dimeric monocation so, formed shows a one-electron electroreduction at a much lower potential.

Key words: Simulation, Cyclic voltammetry, Ruthenocene

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DRUG RELEASE PROFILE OF MALIC ACID-PHTHALIC ACID BUTANE 1,4-DIOL COPOLYESTER

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(Received July 30, 2003; accepted April 20, 2004)

Five copolyesters **(I-V)** in varying mole ratios of malic acid and phthalic acid were separately synthesized with 1 mole of butane 1,4-diol using p-toluene sulfonic acid (0.4% of the total weight) as catalyst under vacuum at 120-125°C for about 6 h . The malic acid-phthalic acid-butane 1,4-diol copolyesters (MPBC) were characterized by their IR spectra, molecular weight, elemental analysis and solubility behavior in common organic solvents. The polymer **III** had the highest molecular weight and it was selected for subsequent experiments. Its hydrolytic degradation study in solutions of different pH values showed that it remained intact in solutions of pH values 1.2-6.0, but gradually degraded in solutions of pH values >6.0. Drug delivery profile of MPBC as an enteric coating material was investigated in simulated gastric fluid (pH 1.2) and then in simulated intestinal fluid (pH 7.4), it was found that the drug release pattern did not conform to enteric coating requirements. In the case of matrix tablets where drug was dispersed in the MPBC, it was found that the drug delivery was zero order up to 12 h releasing 88.0% of diclofenac sodium and up to 13 h releasing 86.50% of naproxen, afterwards release of drugs was negligible.

Key words: Malic acid, Phthalic acid, Copolyester, Drug delivery profile.

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FUSED PYRIMIDINES: *PART-I:* SYNTHESIS OF IMIDAZO[1,2-a]THIENO[2,3-d]-PYRIMIDIN-5(1*H*)- IMINE AND PYRIMIDO[1,2-a] THIENO[2,3-d] PYRIMIDIN-6-IMINE

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(Received November 11, 2003; accepted April 27, 2004)

Annelating reagents, 2-(methylthio)-2-imidazoline **(2)** and 1,4,5,6-tetrahydro-2-methylthiopyrimidine **(4)** were prepared from 1,2-diaminoethane and 1,3-diaminopropane *via* 2-imidazolidinethione and 1,4,5,6-tetrahydropyrimidin-2-thione respectively. The substrate, 2-amino-4,-5-dimethylthiophen-3-carbonitrile **(5)** was prepared from butanone. The reaction of substrate **(5)** with the annelating reagents,**(2)** and **(4)**, in HMPT led to 2,3-dihydro-6,7-dimethylimidazo[1,2-a]thieno[2,3-d]pyrimidin-5(1*H*)-imine **(6)** and 1,2,3,4-tetrahydro-7,8-dimethylpyrimido[1,2-a]thieno[2,3-d]pyrimidin-6-imine **(7)** in good yields.

Key words: Annelating reagents, Substrate, HMPT, Fused pyrimidines.

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QUALITY OF ICE MANUFACTURED IN KARACHI CITY

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The production of ice being sold in the local market of Karachi is neither regulated nor its quality and safety for human consumption is evaluated. This investigation examined the physico-chemical and bacteriological characteristics of 50 ice samples collected from different areas of Karachi city. The water being used for ice manufacturing is of poor quality, almost all the samples were found unsafe as per WHO guidelines for safe drinking water; total bacterial count exceeded the upper limit 100 CFU/mL, forty one samples out of fifty had high coliform and faecal coliform counts. The ice produced in the city by commercial manufacturers is of very poor microbiological quality and its consumption pose an immediate threat to public health. The potential for disease exists in the ice industry of Pakistan which demands special need for the implementation of appropriate remedial measures to ensure that ice produced and sold in the market is safe for human consumption.

Key words: Ice, Microbiological quality, Chemical analysis, Particulate analysis, WHO guidelines.

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 265-267*

STUDIES ON THE UTILIZATION OF SPENT CATALYST USED IN OIL REFINERY

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Enormous amount of the spent cobalt-molybdenum/alumina catalyst, used for the hydrodesulphurization process in the oil refineries, is locally available for its safe disposal. Studies were undertaken on this spent catalyst for the extraction of valuable metals contained in it. Its chemical evaluation indicated the presence of CoO 3.43%, MoO_3 14.50%, Al_2O_3 79.67% and SiO_2 2.40%. In view of the high prices of cobalt and molybdenum in the international market, the research and development work were mainly concentrated on the extraction of these metals. Leaching studies undertaken on the samples indicated the optimum recovery of cobalt up to 96% and 96.5% for molybdenum.

***Key words*:** Catalyst, Hydrodesulphurization process, Leaching, Extraction.

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 268-271*

SYNTHESIS OF SINENSETIN, A NATURALLY OCCURRING POLYMETHOXYFLAVONE

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5, 6, 7, 3′, 4′-Pentamethoxyflavone **(8)** isolated from the leaves of *Orthosiphon stamineus* has been synthesized by following an unambiguous route. All the new products have been characterised on the basis of spectral data and microanalysis.

Key words: Synthesis, Characterisation, Chalcone, Flavone.

Biological Sciences

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 275-280*

Optimization of Progesterone 11α-Hydroxylation in the Presence of β-Cyclodextrin

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Aspergillus ochraceus NRRL 405 was used to hydroxylate progesterone to 11α-hydroxyprogesterone (11α-HP). This study described the effect of some fermentation parameters and the intermittent addition of β-cyclodextrin on the bioconversion process. The Kinaway's medium with pH 6 produced the best result of the used culture media. The transformation period was 48 h for the maximum hydroxylation. The maximum production of 11α-HP (93.10%) was obtained by the addition of 4g/I β-cyclodextrin at 12 h after inoculation compared to the control culture (56.8%). The results also showed the ability of the mould culture to carry out the transformation reaction at high substrate levels without by products formation in the presence of β-cyclodextrin.

Key words**:** 11α-Hydroxyprogesterone (11α-HP), Residual progesterone (RP), β-cyclodexrin.

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 281-291*

INTEGRATED BIOLOGICAL AND CHEMICAL TREATMENT OF BREWERY SLUDGE

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(Received September 26, 2003; accepted May 21, 2004)

Composite samples of sludges obtained from a brewery in Benin City were analysed for their pollution characteristics. The samples were then treated by integrated biological and chemical methods. The analysis revealed that the BOD and COD of the sludge liquor were high, as well as the levels of solids concentration, nitrogen, phosphorus and total bacterial counts. These showed that sludge from the brewery have high pollution potentials and therefore, needed treatment before disposal or reuse. The sludges were treated by integrated biological and chemical methods. Percentage solids reduction achieved were in the range of 21.4 - 27% total solid (TS), 27 - 32% suspended solids (SS) and 32 - 48% volatile solids (VS) for integrated aerobic/chemical treatment and 24.3 - 27.2% TS, 30.3 - 33% SS and 34.4 - 36% VS for anaerobic/chemical treatment. BOD and COD reductions were in the range of 97 - 98 and 97.3 - 98.2%, respectively for aerobic/chemical treatment and 97.7 - 97.9 and 98 - 98.3%, respectively for anaerobic/chemical treatment. Phosphorus, ammonia and nitrate nitrogen were found to be substantially reduced in this sludge thus preventing the eutrophication of water bodies, up to 57 - 85.2% NH_3 and 31.7 - 61.9% NO_3. Reduction was achieved using aerobic/chemical treatment while the anaerobic/chemical method achieved a reduction of up 100% NO_3.

Key words**:** Brewery sludge, Pollution, Chemical treatment, Biological techniques, Eutrophication.

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 292-297*

PARTIAL PURIFICATION AND CHARACTERIZATION OF GLYCOLIPID ISOLATED FROM *COLLETOTRICHUM LINDEMUTHIANUM*

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Colletotrichum lindemuthianum, the causative agent of anthracnose in beans (*Phaseolus vulgaris)* was successfully cultured in a complex medium of glucose/neopeptone. The extracellular High Molecular Weight Culture Filtrate Elicitor (HMWCFE) was isolated by simultaneous dialysis and ultrafiltration of nominal cutoff 30,000 dalton cartridge systems. Chromatographic separation provided two fractions Partially Purified Fraction, PPF-I (Mr 2000,000) and PPF-II (Mr < 40,000). Extraction with organic solvents showed that lipid was found in crude preparations. Methanolysis of PPF-I and II analyzed by GC, provided a series of fatty acids characterized by GC-MS viz: behenic (C_{22}), arachidic (C_{20}), isostearic (C_{18}), oleic ($C^{9}_{18:1}$), palmitic (C_{16}), myristic (C_{14}) and capric (C_{10}) acids. Not all the lipid material was released under mild basic hydrolyzing conditions indicating the presence of some stable linkages between lipid and sugar moieties.

Key words**:** *Colletotrichum lindemuthianum*, Elicitor, Fatty acids, Carbohydrate.

Pak. J. Sci. Ind. Res. 2004 ***47*** *(4) 298-302*

Influence of Common Purslane Aqueous Extracts on Germination and Seedling Growth of Rice

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Aqueous extracts of various parts of leaf, stem and root of common purslane were evaluated alone or in combination with NaC1 to see their effects on germination and seedlings growth of rice. Leaf and stem extracts have no effects on germination, while the root extract alongwith 0.4% NaC1 decreased the rice seed germination. However, length of both shoot and root were significantly decreased under extracts alone or in combination with NaC1 levels. Root growth was affected more than the shoot irrespective of the treatments.

Key words: Common purslane, Aqueous extracts, Rice.

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LIPID CLASSES OF *HORDEUM VULGARE*

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(Received December 31, 2002; accepted June 28, 2004)

Two local varieties of *Hordeum vulgare Jao 87,* and *Jao 83* were studied for their lipid classes and fatty acid composition. Total barley lipids were solvent extracted and classified into their respective classes with the help of silicic acid gel column chromatography. Each lipid class was further fractionated by thin layer chromatography, and after methylation, its fatty acid composition was determined by gas chromatography. The lipid contents were 3-3.2% of the total barley weight in both the varieties. The percentages of neutral lipids, glycolipids and phospholipids, were 70, 10 and 20%, respectively. Gas chromatography showed the presence of fatty acids from series lauric ($C_{12:0}$) to arachidic ($C_{20:0}$) while linoleic acid ($C_{18:2}$) was the principal fatty acid in all the classes with a few exceptions.

Key word: *Hordeum vulgare,* Lipids, Fatty acids, Methyl esters, GC, TLC.

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 309-311*

DISPERSING AND PARASITIZING ABILITY IN *TRICHOGRAMMA CHILONIS* ISHII IN EARLY AND LATE SOWN NIAB-86 COTTON VARIETY

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(Received May 21, 2002; accepted July 7, 2004)

Egg parasitoids *Trichogramma chilonis* were released in cotton by planting after early and late sown NIAB-86 to find out dispersing and parasitizing potential. Observations on percent parasitization were taken at distances of 1-5 meters from fixed releasing sites. It was recorded that the dispersal of *T. chilonis* was physically affected by crop growth and climatic conditions. The maximum dispersal and parasitization was recorded in late September and in early October. Intensity of parasitization was more after 24 h as compared to 48 h post release of parasitoids.

***Key words*:** Dispersal, *Trichogramma chilonis*, Parasitization, Cotton.

Pak. J. Sci. Ind. Res. 2004 ***47*** *(4) 312-315*

RECLAMATION OF WASTE LUBRICATING OILS USING GROUND PERIWINKLE SHELL ADSORBENTS

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(Received December 12, 2002; accepted March 25, 2004)

Acid treated ground periwinkle (*Fuscatus tympanotonu*) shell adsorbents were used in the reclamation of used hydraulic oil by both the continuous elution and bed filtration techniques.Quantitative yields of oils were obtained by both techniques. The bed filtration technique gave clear oils but was slower than the continuous elution technique. Comparison with conventional adsorbents showed that the ground shell adsorbent was comparable to fullers earth and better than silica or alumina. Elevated temperature oxidation of the reclaimed oils in the presence of atmospheric oxygen gave resins, which could be used in the production of paints, leather polishes and wood varnishes.

Key words. Lubricating oils, Ground periwinkle shell, *Fucatus tympanotonu.*

Pak. J. Sci. Ind. Res. 2004 ***47****(4) 316-321*

MONOCULTURE OF SILVER BARB (*BARBODES GONIONOTUS*) VS. MIXED CULTURE WITH GIFT (*OREOCHROMIS NILOTICUS*) IN SEASONAL MINI PONDS UNDER FARMING SYSTEM IN BANGLADESH

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The comparative production performance and the feasibility of production of fish in unutilized seasonal mini ponds under farmer's condition through culturing silver barb (*Barbodes gonionotus* Bleeker) in mono and mixed culture with Genetically Improved Farmed Tilapia (GIFT) (*Oreochromis niloticus*.L) was investigated in six seasonal mini ponds of 0.02 ha each for five months. Silver barb mono culture (Treatment-1) and mixed culture (Treatment-2) with GIFT were tested with stocking density of 16,000/ha of fish for both treatments. There was no significant variation on either water quality parameters or abundance of planktonic organisms due to different culture systems of silver barb. In mixed culture (T2) system, GIFT ranked 1st position in the production (1442.90 kg/ha) and the individual production of silver barb was 856.36 kg/ha. A significantly ($P < 0.05$) higher total production (2299.26 kg/ha) of fish and net benefit (58, 383.12 TK/ha or US$ 1004/ha) was recorded in the mixed culture (T2) than that of the total production (1606.53 kg/ha) and net benefit (31, 774.26 TK/ha or US$ 546.42/ha) of monoculture system (T1).

Key words**:** *Barbodes gonionotus*, *Oreochromis niloticus* L. Mono and mixed culture, Mini ponds, Farming system.

Pak. J. Sci. Ind. Res 2004 ***47****(4) 322-324*

MODIFICATION OF RAPID METHOD FOR PHYTIC ACID DETERMINATION IN WHEAT AND ITS PRODUCTION

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Phytic acid, present in cereals and grain legumes, is determined by several procedures involving different principles. The most common and practical is the one with extraction of phytic acid with acid solution, reaction with iron solution of known concentration and back determination of the free iron. Back determination is carried out using the 2,2-bipyridine reagent. This, besides being expensive, has several other demerits. The determination is time bound, measurement is possible in only a limited range of concentrations and the concentration dependency of the procedure is relatively low. The procedure was modified by replacing the 2,2-bipyridine procedure with potassium thiocyanate after making the necessary procedural adjustments. The curve with the pyridine procedure becomes parallel to X-axis at concentrations beyond 30µg/ml of P-Phytate; whereas that of the KSCN procedure remains straight line, indicating its applicability in even higher concentration ranges. The procedure was validated using recovery studies.

Key words: Phytic acid, Cereals, Method modification.