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Physical Sciences

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ULTRASONIC STUDIES OF GLYCOL SOLUTIONS AND THEIR MIXTURES WITH WATER

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Concentration dependence of the adiabatic compressibility and velocity in aqueous solutions of various concentrations of glycols atmospheric pressure have been studied using the ultrasonic interferometric technique, the measurements have been performed at 2 MHz, in the temperature range 25 to 40°C. The adiabatic compressibility has been evaluated from the collected data. The dependence of compressibility and sound velocity on the concentration at adiabatic conditions have been evaluated with average density at four different temperatures. The molecular interaction has also been evaluated from the data collected, using its excess value to determine their thermodynamic properties. It reveals that the change in velocity is maximum in one of the three glycol solutions and compressibility is minimum at a particular concentration.

Key words: Glycol solution, Ultrasonic velocity, Adiabatic compressibility.

POTENTIAL ANTIBACTERIAL AGENTS *PART-V*. SYNTHESIS AND STRUCTURAL CHARACTERIZATION OF SOME NEW 3-ARYL 7H, 6-(ARYL) 5H-1, 2, 4-TRIAZOLO [3, 4-b]-1, 3, 5-THIADIAZINES

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N-(Substituted benzoyl) thiosemicarbazides **11a-e** were treated with sodium hydroxide solution to give 3-aryl-5-mercapto-4H-1,2,4- triazole **11a-e** which were subjected to Mannich Reaction in presence of 2-OC₂H₅, 4-NO₂ and 2-OCH₃ substituted anilines to give 3-aryl 7H, 6-(aryl) 5H-1,2,4-triazolo [3,4-b]-1,3,5-thiadiazines **IVa-h**. The compounds, **IVa-h** were compared with oxytetracycline and ampiclox (standard antibiotics) for their antibacterial activity.

Key words: Fused ring heterocyclic compounds, Triazolothiadiazines, Intramolecular Mannich condensation.

DISTRIBUTION OF HEAVY METALS IN THE SEDIMENTS OF LAGOS LAGOON

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(Receieved 17 July 1999; accepted 21 February 2000)

The concentrations of cadmium, lead, nickel, chromium, copper, zinc, iron, manganese, cobalt and mercury in the sediments of the Lagos lagoon were determined by atomic absorption spectrophotometry in the year 1998. The respective ranges of the concentrations of the metals were Cd:0.13-8.60, Pb:4.10-295.70, Ni: 11.60-149.40, Cr:23.30-167.20, Cu:4.80-102.70, Zn:27.30-323.70, Fe:10579.80-85548.00, Mn:276.00-748.00, Co:6.40-41.50 and Hg:0.04-0.53mg kg⁻¹ dry weight. The data showed considerable variation in the values from one sampling station to the other. Highest values of metals were obtained at sampling station 3(Iddo).

Key words: Sediments, Heavy metal pollution, Lagoon industries, Metal accumulation.

MEASUREMENT OF SULPHUR DIOXIDE AND PM10 AT KORANGI INDUSTRIAL AREA AND PHOTOCHEMICAL OXIDANTS AT UPTOWN AREA OF KARACHI

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Baseline measurements of sulphure dioxide and PM10 were carried out by Air Pollution Monitoring Mobile Laboratory in the Korangi Industrial Area of Karachi. This is the first study performed in this area. The highest concentration of SO₂ and PM10 was found to be 25.8 and 177.9 µgm⁻³ respectively. Both SO₂ and PM10 shows similar variations throughout the measurement period, this indicates that these pollutants originate from a similar source. Traffic density at the sampling site was also low and it was concluded that the contribution of SO₂ and PM10 from mobile sources in this area is relatively small. The pollution found in this area is mostly within WHO threshold limits. Ozone and oxides of nitrogen were also measured at a sampling site located in the uptown area of Karachi. Average variations of O₃, NO, NO_x and solar radiation have been presented for winter. The formation of ozone due to photochemical reactions has also been discussed. Ambient concentrations of NO, NO_x and O₃, are strongly interrelated. It has been concluded that the level of photochemical oxidants found in this area during winter time is mainly due to vehicular traffic from near by super high way.

Key words: Air pollution, SO₂, PM10, Photochemical oxidants.

A COMPARATIVE STUDY OF SELECTED AFRICAN EDIBLE OILS AND THEIR POTENTIAL DOMESTIC AND INDUSTRIAL APPLICATIONS

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A comparative study on the physical and chemical characteristics. Melon seed oil (*Colocynthis Citrullus* L.), African oil bean oil (*Penta celethra, macrophylla*) and Avocado pear oil (*Perse, Americana*) was undertaken to assess their potential domestic and industrial applications. This study focussed on the percentage oil content, individual odour (aroma), specific gravity, refractive index, relative viscosities, smoke points, acid values, free fatty acid contents (%), iodine values, and ester values. The iodine values obtained for these oils were: 151.72 (melon seed); 113.00 (African oil bean oil); 43.30 (Avocado oil). The same oils showed free fatty acid contents as 2.38%; 0.97% and 0.37% respectively, whereas acid values recorded were 4.76 (melon); 1.65 (African oil bean oil) and 0.82 (Avocado pear oil). The saponification values were 197.56 (melon), 185.08 (African oil bean oil) and 246.70 (Avocado pear oil) and the individual Ester values were 192.81 (melon), 183.63 (African oil bean oil) and 241.50 (Avocado pear oil). Melon seed, African oil bean seed and Avocado pear gave 57.40%; 42.07% and 15.13% of oil following the extraction procedures outlined in the project. The potential domestic and industrial applications of the oils under study have been discussed in line with their physical and chemical characteristics.

Key words: Edible oils, Dielectric constant, Relaxation time, Viscosity, Loss factor.

HYDRAULIC PERFORMANCE OF THE RAINGUN (PY₁-30) WITH 6 mm DIAMETER NOZZLE

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The raingun (PY₁-30) with 6 mm diameter nozzle was operated under different pressures ranging from 20 to 80 psi. The discharge of the raingun and the radius of coverage increased with the increase in pressure being 12.59 gpm and 18.5 m at 80 psi pressure. The maximum and minimum theoretical application rates were found to be 2.66 mm h⁻¹ at 80 psi and 1.33 mm h⁻¹ at 35 psi, respectively. In respect of coverage the high coefficients of uniformity were found in the first quarter and the low coefficients of uniformity in the fourth quarter.

Key words: Hydraulic performance, Raingun, Nozzle.

Short Communication

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PHYSICO-CHEMICAL AND METAL COMPOSITION OF *CALOPHYLLUM INOPHYLLUM* SEED AND SEED OIL

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Biological Sciences

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THE UPTAKE AND LOSS OF ABSORBED DISSOLVED COPPER BY *CLARIAS ANGULLARIS* FINGERLINGS

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(Received 19 March 1998; accepted 17 April 2000)

The uptake and loss of dissolved copper in media by the African mud fish *Clarias angullaris* was studied in water of 25mg l⁻¹ hardness expressed as CaCO₃ of pH 6.8 at 27±2°C in a static test system. The uptake experiments involved exposure of fish to 0.5, 0.75 and 1.0 mg Cu⁺² l⁻¹ test solutions from which the fish absorbed and retained 0.9912, 1.3010 mg and 1.4036 mg Cu⁺² g⁻¹ wet fish wt. respectively, after 11 days. In the loss experiments, the fish were exposed to 0.5, 0.75 and 1.0 mg Cu⁺² l⁻¹ for 7 days and the surviving fish were allowed to recover in copper-free-water for over 20 days. Approximately 50% of the absorbed copper was shed from all fish within 2 days. After 20 days the fish held 0.1019, 0.1296 and 0.1010 mg Cu⁺² g⁻¹ wet wt from previous exposures to 0.5, 0.75 and 1.0 mg Cu⁺² l⁻¹ respectively.

Key words: Dissolved copper, Uptake and loss; *Clarias angullaris*.

HETEROSIS STUDIES IN INTRASPECIFIC CROSSES OF *GOSSYPIMUM HIRSUTUM* L.

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(Received 16 February 1998; accepted 2 May 2000)

Studies on heterosis were carried out in five intraspecific hybrids of tetraploid cotton *Gossypium hirsutum* L. All hybrids manifested positive heterosis over mid-parent and control variety Qalandri regarding yield per plant. The extent of heterosis recorded was 60.2% and 94.3% over mid-parent and check variety Qalandri respectively. For boll weight the heterosis ranged from -1.52 to + 49.5%, for plant height from -7.40 to + 39.22%, for sympodia per plant from + 0.99 to + 2.70% and for staple length from + 1.82 to + 4.0%.

Key words: Heterosis, *Gossypium hirsutum*, Intraspecific hybrids.

BIO-CONCENTRATION OF MACRO AND TRACE MINERALS IN FOUR PRAWNS LIVING IN LAGOS LAGOON

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(Received 3 June 1998; accepted 29 May 2000)

Mineral levels of trace (Cd, Zn, Ni, Fe, Cu and Co) and macro (Ca, Mg, Na, K and P) were determined in four prawns: *Macrobrachium vollenhovenii*, *Palaemon* species A, *Penaeus notialis* and *Penaeus kerathurus* in the Lagos lagoon water in Epe area of Lagos State, Nigeria. The levels of Cd, Zn, Ni, Fe, Cu, Na, and P were higher in prawn samples than in water while Mg was more concentrated in water but Co was not detected in water. There was evidence of mineral bioconcentration in all the samples. Individual prawn mineral concentration followed the following patterns: *M vollenhovenii* > *P notialis* > *P species A* > *P kerathurus* (for trace minerals) and *P kerathurus* > *P notialis* > *P species A* > *M vollenhovenii* for macrominerals suggesting that mineral concentration may be a factor of size and species.

Key words: Prawns, Mineral bioconcentration, Metal pollutant.

NEW MITE (HYPOPUS) FROM CENTRAL PUNJAB (PAKISTAN) IN THE FAMILY ACARIDAE (ACARI: ASTIGMATA)

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(Received 20 April 1998; accepted 31 May 2000)

One new species *Lackerbaueria fatigo* representing the genus *Lackerbaueria* Zakhvatkin, 1941 is described from the hypopial stage. A key, comparison of characters, similarity matrix and phenogram are given to all the known species in this genus.

Key words: *Lackerbaueria*, Mite, Acaridae.

Short Communication

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**PREPARATION AND EVALUATION OF
ALKYD RESIN FROM CASTOR OIL**

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Technology

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CHEMICAL AND OXIDATIVE CHANGES IN FRIED BITTER GOURD AND ONION DURING STORAGE

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(Received 28 April 1998; accepted 3 February 2000)

The present study was carried out to extend the shelf life of the fried bitter gourds and onions by the addition of antioxidant in soyabean oil during frying process. Chemical and oxidative changes in fried bitter gourds and onions were also investigated during storage. Crude protein and mineral contents of both the fried vegetables remained unchanged. However, reduction in moisture contents along with marked increase in fat contents was observed in fried vegetables. Significant improvement in protein digestibility was also observed in both the vegetables after frying. Addition of antioxidant in the frying oil remarkably reduced FFA and POV of processed vegetables during storage at 25° and 45°C. Addition of 2% antioxidant reduced FFA from 0.346 to 0.079% and POV from 91.6 to 30.0 meq kg⁻¹ at 45°C on storage of fried bitter gourds while in case of onions, FFA from 0.372 to 0.055% and POV from 121.6 to 0.102 meq/Kg during storage for six months. Subjective evaluation studies showed that these processed vegetables, on six months storage at 45°C, were organoleptically acceptable. Therefore, it is concluded that addition of 2% antioxidant extended the shelf life of the fried vegetables up to six months.

Key words: Bitter gourd, Onion, Storage temperatures, Chemical and oxidative changes.