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Physical Sciences

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PROXIMATE COMPOSITION, SOME NUTRITIONALLY VALUABLE MINERALS AND FUNCTIONAL PROPERTIES OF WALNUT (*TETRACARPIDIUM CONOPHORUM* (MUELL. ARG.) FLOUR

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Full fat walnut (*Tetracarpidium conophorum*) seed flour was produced and evaluated for proximate and nutritionally valuable mineral composition and functional properties. The proximate composition of walnut was characterized by relatively high protein (14.75%), total carbohydrates (18.87%), fat (51.68%), crude fibre (1.16%) and ash (3.73%). The mineral analysis showed that seed flour was rich in the content of sodium, potassium and phosphorus. The foaming capacity and the least gelation concentration of the seed flour were found to be 7.8% and 5.10%, respectively. The effects of dilute solutions of NaCl and KCl on some functional properties of the seed flour were also examined. The results indicated that addition of NaCl or KCl solution improved the functional properties of the seed flour.

Key words: Composition, Mineral content, Functional properties, Walnut flour, *Tetracarpidium conophorum*.

PREPARATION AND CHARACTERISATION OF FIRST ROW TRANSITION METAL COMPLEXES WITH QUADRIDENTATE TRIPODAL LIGAND TREN [TREN=TRIS (2-AMINOETHYL) AMINE]

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Isothiocyanato complexes of first row transition metals with quadridentate tripodal ligand, tris(2-aminoethyl) amine, (tren), were prepared and characterized. Empirical formula of the compounds was determined on the basis of elemental analysis. All except Co-compounds have the general formula $[M(tren)NCS]SCN$ ($M=Mn(II)$, $Ni(II)$, $Cu(II)$ and $Zn(II)$). In the case of Co-compound, chloride ion remains as counter ion. The bonding pattern of the compounds have been discussed on the basis of IR and UV-visible spectral analysis. The SCN ion, bonded to metal through the N atom, has also been supported by the spectra. X-ray powder pattern of the complexes were also examined.

Key words: Transition metal complexes, Quadridentate tripodal ligand, Tris amine.

EFFECTS OF AGITATION AND BITTERN QUALITY ON RECOVERY OF MAGNESIUM SULPHATE

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Experiments have been conducted in an externally cooled batch chiller (crystallizer) to study the effects of (i) agitation level, (ii) stirrer design and (iii) quality of sea bittern, on the recovery of magnesium sulphate and other variables like heat flow rate, heat of crystallization and heat transfer coefficient. The studies indicate that the linearity of temp-time plot and its slope are neither affected by the agitation level nor by quality of sea bittern (excepting spent sea bittern). Recovery/crystallization patterns (or conc-temp relationships) have been found critically dependent on agitation level, degree of turbulence, stirrer design and bittern quality. Three straight blades stirrer is found to be more suitable whereas, 6 curved blades stirrer causes greater turbulence thereby resulting into reduced recovery. The optimum level of agitation is found to be around 165 r p m (tip velocity 62.5 m min^{-1} and Reynolds number 13000), around which incidently, both, (a) percent recovery against temperature and (b) energy consumed in stirring, Kj min^{-1} Vs Reynolds number behave linearly, the recovery is at its optimal, and the energy consumption is minimum. Beyond the optimal limit of (165 r p m) 62.54 m min^{-1} tip velocity, the performance parameters become independent of agitation rate, however, under such situation they are influenced by the quality of sea bittern and hence found to change unpredictably. Normal sea bittern is found to be a suitable raw material, whereas any pretreatment of normal bittern renders it unsuitable and at times an uneconomical raw material.

Key words: Sea bittern, Magnesium sulphate, Heat of crystallization, Heat transfer coefficient.

Short Communication

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ESSENTIAL ELEMENTS IN DIFFERENT PARTS OF KASNI (*CICHORIUMINTYBUS*)

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THE INFLUENCE OF pH DURING GROWTH OF BACTERIA IN TOLUENE

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Five toluene tolerant species were isolated from the activated sludge of a wastewater treatment plant (Dublin). The isolate were investigated for influence of pH on the growth in toluene. Four of the bacteria have been identified as *Pseudomonas putida* and one as an *Aeromonas caviae*. When these bacteria were grown with toluene as the sole source of carbon and energy, the pH of the culture medium became acidic and dropped. 0.5 M sodium phosphate buffer was selected to investigate the optimum pH for growth in the presence of 500 µl of toluene. In general, the growth was optimum between pH 5.8 and 7.4.

Key words: Activated sludge, Toluene, pH, Wastewater, Biodegradation.

BACTERIAL FLORA IN MARINE SEDIMENTS OF THE EASTERN ANTARCTIC REGION WITH SPECIAL REFERENCE TO BERKILEN BAY

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In microbial analysis of marine muddy sediments from the Berkilen Bay area near Jinnah Antarctic Base of Pakistan, bacterial counts of aerobic heterotrophs were determined on Tryptic Soya Agar with additional NaCl (3.5%) incubated at 0°, 5°, 10°, 25° and 37° C for 2 days to 4 weeks. The mean bacterial count (Colony Forming Units, CFU/g) of sediment was 1.2×10^4 CFUg⁻¹ at 0°C; 2.6×10^3 CFUg⁻¹ at 5°C; 1.1×10^4 CFUg⁻¹ at 10°C; 2.7×10^4 CFUg⁻¹ at 25°C and 2.3×10^4 CFUg⁻¹ at 37°C. Bacteria isolated were psychrotrophs rather than psychrophiles. Among the identified genera gram positive dominated the gram negative. Genera isolated in the order of predominance were *Micrococcus*, *Moraxella*, *Staphylococcus*, *Bacillus*, *Pseudomonas* and *Flavobacterium*. The percentage of unidentified bacteria was quite low.

Key words: Marine sediments, Bacterial flora, Antarctic region, Berkilen Bay.

APPLICATION OF COMMERCIAL SANITIZERS IN CHICKEN HOUSES

PART I. GROWTH AND MEAT QUALITY

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Four disinfectants employed as sanitizer in the chicken houses were TH4, Prophyl, Beloran and Fourtedes. This phased study was completed in 45 days. The stimulating effect showed considerable variability in all the four disinfectants. The mean values of feed conversion ratios of the experimental groups were better than the control group. Gross pathological study of trachea, lungs and liver was also carried out. Application of all the four sanitizers was found to be safe as no toxic effects were recorded. Chemical analysis of meat derived from these chickens showed non significant variations within a narrow range. Except for the fat and moisture content the parameters other tested showed nonsignificant differences ($P>0.05$).

Key words: Broiler, Sanitizers, Growth, Meat.

POPULATION DYNAMICS AND THE MANAGEMENT OF THE HARDTAIL SCAD *MEGALASPIS CORDYLA* FROM THE BAY OF BENGAL

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FiSAT program was used to estimate population parameters of *Megalaspis cordyla* from length frequency data. L_{∞} and K were found to be 38.5 cm and 0.54 year⁻¹, respectively. The Wetherall plot provided an estimate of L_{∞} and Z/K as 38.12 cm and 3.902, respectively. The annual rates of natural and fishing mortality were estimated as 1.17 and 1.11, respectively. The exploitation rate was 0.51. The selection pattern L_{50} was 22.32 cm. Recruitment pattern suggests of one main pulse in May-August. Maximum yield could be achieved simultaneously decreasing length at first capture to 18.0 cm. The relationship between total length and body weight was found to be $W = 0.01794 L^{2.8184}$. Highest yield and price could be achieved by increasing the fishing mortality to 1.25 coefficient rate.

Key words: *Megalaspis cordyla*, Population dynamics, Bay of Bengal.

STUDIES ON THE CONTROL OF POWDER-POST BEETLES (*LYCTUS* spp) BY INDIGENOUS PESTICIDE IN COMPARISON TO DDT AND BHC

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(Received 15 March 1999; accepted 5 April 2000)

Studies were conducted with a view to promoting indigenous pesticides for the control of *Lyctus* spp (powder-post beetles). Tenekil (A multichlorinated hydrocarbon, developed and formulated at PCSIR Laboratories Complex, Karachi) at the doses of 0.5%, 1% & 1.5% gave 58%, 71.6% & 94% mortality of *Lyctus* powder-post beetle in different infested wooden samples under laboratory conditions after 24 h. DDT at the same concentrations gave 40%, 43.3% and 58.3% mortality, whereas BHC gave slightly higher mortality i.e 45.6%, 51.6% and 60.3%.

Key words: Tenekil, Furniture-pest control, DDT, *Lyctus* beetles.

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Key words: Tenekil, Furniture-pest control, DDT, *Lyctus* beetles.

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GENETIC VARIABILITY, CORRELATION AND PATH ANALYSIS OF YIELD CONTRIBUTING CHARACTERS IN SWEET POTATO (*IPOMOEA BATATAS* LAM.)

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Technology

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FLOTATION CHARACTERISTICS OF LEAD-ZINC ORE FROM BESHAM, DISTRICT SWAT, NWFP, PAKISTAN

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Metallurgical grade concentrates of lead and zinc, each assaying over 50% metal content, have been produced by two stage flotation from Besham lead-zinc ore. The ore consists of mainly galena (PbS) and sphalerite (ZnS) as economic minerals while Fe-sulphide/oxide, quartz and other silicates are the gangue minerals. The average concentration of galena and sphalerite in head sample is 0.86% and 9.97% respectively. Both galena and sphalerite can be recovered at a feed size of 85-90% passing 74 microns (wet grinding along with 0.5 kg t⁻¹ of sodium cyanide) with pulp density of 25% solids. Galena is recovered as a first step by adjusting pulp pH at 9 with lime. Potassium ethyl xanthate is used as collector and D-250 (polypropylene glycol) as frother. The recovery of sphalerite is made by activation with the help of copper sulphate at pH 11 with the same operational condition as that of galena. The final recoveries are over 90% of Lead and zinc from the ore.

Key words: Flotation characteristics, Lead-zinc ore, Besham, Galena sphalerite.

Review Article

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REFRACTORY RAW MATERIALS OF PAKISTAN BEYOND THE YEAR 2000

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Pakistan refractory bricks industry is in infancy stage despite the fact that domestic demand of these bricks is growing fast and good quality refractory minerals are abundantly available in the country. Most of the refractory bricks requirements by local steel, glass, ceramics, oil refinery and other industries are being met through import. Important refractory minerals occurring in Pakistan include large deposits of chromite, magnesite, dolomite, bauxite, fire clay, kaolin, dunite and quartzite. This paper briefly reviews the quality and size of major refractory mineral deposits and various legal, financial, technical and other factors necessary for the development of refractory bricks industry in Pakistan.

Key words: Refractory materials, Brick industry, Minerals.
