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Physical Sciences

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SYNTHESIS OF 5, 7-DIHYDROXY-8-C-PRENYLFLAVANONE

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5,7-Dihydroxy-8-C-prenylflavanone (VII, glabranin) Mitscher *et al* 1983) isolated from the roots and stems of *Glycyrriza lepidota* has been synthesized by following unambiguous route. All the new products have been characterized on the basis of spectral data.

Key words: Synthesis, Chalcone, Flavanone.

MOSSBAUER SPECTRAL STUDIES OF TRI-DI- AND CHLORODI-ORGANOTIN CARBOXYLATES

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^{119m}Sn Mossbauer data are reported for some organotin derivatives of type R_3SnL , R_2SnCIL , R_2SnL_2 and $[(R_2SnL)_2O]_2$ where $R = CH_3$, C_2H_5 , $n-C_4H_9$, C_6H_5 , C_6H_{11} , $C_6H_5CH_2$ and $L = \text{trans-3-(2-furanyl)-2-propenoic (FA) and trans-3-(3-methylphenyl)-2-propenoic (CA) acids}$. The stereochemistry of these derivatives and C-Sn-C bond angles for R_2SnL_2 and $[(R_2SnL)_2O]_2$ are calculated.

Key words: Mossbauer spectral, Chlorodi-Organotin.

SOME ORGANOPEROXO COMPLEXES OF ZIRCONIUM (IV), THORIUM (IV) AND URANIUM (VI)

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Some new peroxo complexes of Zr (IV), Th (IV) and U (VI) containing organic ligands, L^I , $[N_4C_8H_{16}(C_6H_4OH)_2]$; L^{II} , $[N_2C_5H_8(C_6H_4OH)_2]$; L^{III} , $[(C_6H_5CNC_2H_4NH_2)_2]$ and L^{IV} , $[C_6H_4NNH-CHC_6H_4OH]$ have been synthesized and characterized. These have compositions, $[Zr(O_2)L^I]$, $[Th(O_2)L^I] \cdot H_2O$, $[U(O)(O_2)L^{II}] \cdot H_2O$, $[U(O)(O_2)L^{III}]$, $[Zr(O_2)_2L^{III}] \cdot H_2O$, $[U(O)_2(O_2)L^{III}]$, $[Zr(O_2)(SCN)L^{IV}]$, $[Zr(O_2)(SCN)_2L^{III}]$, and $[Th(O_2)(SCN)L^{IV}]$. The complexes are found to be inert towards oxidation of triphenylphosphine, triphenylarsine and allyl alcohol. The size of the metals as well as the electronic nature of the organic ligands influence the mode of coordination of the peroxo moiety. IR spectra reveal that ν_3 mode of $Zr(O_2)$, $Th(O_2)$ and $U(O_2)$ groupings (i.e., O-O stretch) decreases with an increase in atomic number of metals in a particular group.

Key words: Organoperoxo complexes, Heavy metals.

GRAFTING OF ACRYLONITRILE ONTO POTATO STARCH (PS) USING CERIC AMMONIUM NITRATE AS INITIATOR

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Graft copolymerization of acrylonitrile (AN) onto potato starch (PS) using ceric ammonium nitrate as initiator was accomplished. Before grafting starch was gelatinized in two ways; one is dispersing PS in water and other in aqueous butanol. The results show that PS gelatinized in aqueous iso-butanol facilitates the grafting of growing polymer chain of AN onto backbone slightly better than PS gelatinized in water. The effects of monomer, backbone and catalyst concentration on rate of conversion of monomer, rate of graft copolymerization, rate of homopolymerization, grafting efficiency and grafting rate are discussed in detail. The absorbency of saponified products of each sample was determined in distilled water, tap water and aqueous solution of NaCl and KCl and discussed thoroughly.

Key words: Graft copolymerization, Acrylonitrile, Potato starch (PS)

POTENTIOMETRIC DETERMINATIONS OF DISSOCIATION CONSTANTS AND THERMODYNAMIC PARAMETERS OF 4-AMINOQUINOLINE IN AQUEOUS, AQUEOUS-DIOXANE, AQUEOUS EtOH AND AQUEOUS-MeOH SOLUTIONS AT VARIOUS TEMPERATURES

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(Received 2 August 1999; accepted 1 March 2001)

The dissociation constant (pK_a) and thermodynamic parameters Gibb's free energies of 4-aminoquinoline are measured by potentiometric pH titrations in aqueous solution at 25 to 50°C and in three mixed aqua-organic media (dioxane, EtOH and MeOH) at 25°C $\pm$ 0.1°C. It is observed that pK_a^M and pK_a^T (concentration ionization and thermodynamic ionization constants) values of 4-aminoquinoline decrease with the increase in temperature and concentration of organic-water solvent systems. The curve is a parabolic one. It is noted that the pK_a^M and pK_a^T values of this compound are higher than that quinoline and some of its amino derivatives. These results are discussed in terms of solvent characteristics, solvent basicity and stabilization of conjugate acid for base by hydrogen bonding interaction in hydro-organic solvent media. The values of dissociation constant are calculated by a computer program written in GW-BASIC. From pK_a values Gibb's free energies are computed and discussed in terms of solute solvent interactions.

Key words: Dissociation constants, Thermodynamic ionization constant, 4-Aminoquinoline

Short Communication

Pak J Sci Ind Res 2001 44 (4) 215-217

ELECTRON IMPACT STUDIES ON SOME ETHYL 2,3-DIOXOBUTYRATE-2-PHENYLHYDRAZONES

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Biological Sciences

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STUDY OF THE COUMARIN AND VOLATILE OIL COMPOSITION FROM AERIAL PARTS OF *ACHILLEA MILLEFOLIUM* L.

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Aerial parts of *Achillea millefolium* L. (Fam. Asteraceae) were exhaustively extracted with ethanol (90%) and then the extract was fractionated into coumarin and unsaponifiable fractions. The coumarin fraction led to the isolation of scopoletin I, umbelliferone II and aesculetin III, whereas b-amyrin, a mixture of steroidal components were identified using GLC. Besides, the volatile oils from the leaves and stems of *A. millefolium* were separately analyzed using GC/MS chromatographic analysis.

Key words: Asteraceae, *Achillea millefolium* L., Coumarins, Sterols, Volatile oil.

UTILIZATION OF RAPESEED MEAL/CAKE IN POULTRY FEED. III. EFFECT OF INCORPORATING INCREASED LEVELS OF RAPESEED CAKE ((POST-AUTOCCLAVING EXTRACTION) ON PERFORMANCE OF BROWN-EGG-LAYER (TETRA SL).

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The effect of increased levels of rapeseed cake obtained from autoclaved rapeseed on laying performance of brown-egg-layer was studied. The rapeseed cake (RSC) remaining after extraction of oil from the seed, was incorporated in layer ration at levels of 15, 20 and 25%. The birds fed on RSC diet were observed for production performance, feed intake and feed conversion ratio, livability and egg quality parameters and then compared with birds maintained on standard ration (RSC free diet). The results indicated higher egg production in standard and 15% RSC group (61 and 60% respectively), though statistically nonsignificant, compared to the other two group (55% each). Egg size slightly decreased from 63.26g (standard group) to 59.17g (25% RSC group). Increase in the level of RSC resulted in increase in the proportion of egg white and decrease in yolk of hens fed on it. Similarly, the protein content of egg white of hen receiving 25% RSC was maximum and its yolk protein content was minimum, indicating some influence of RSC on protein biosynthesis. Organoleptic tests judge by 7 experienced persons revealed no difference in overall acceptability among different groups.

Key words: Rapeseed cake, Layers, Production performance, Autoclaving.

MICROBIOLOGICAL SUITABILITY OF AFRICAN BITTER YAM STARCH

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Starch was extracted from African Bitter Yam (*Dioscorea dumetorum*) and its physical properties were determined. Its ability to support growth of microorganisms was assessed and compared with maize starch BP. Both starches were used to prepare compressed tablets by wet granulation method. Some physical characteristics of the tablets were determined. The tablets were further tested for the ability to support microbial growth soon after production and after storage at ambient conditions for four weeks. Both starches as well as lactose tablets containing them did not support the growth of coliform organisms and *Salmonella* species. Maize starch BP supported growth of microorganisms more than African Bitter Yam starch. All the tablets complied with the British Pharmacopoea standards for uncoated tablets. Tablets containing maize starch BP and those containing African Bitter Yam starch did not support the growth of coliform organisms and *Salmonella* species. Tablets containing Yam starch supported much less microbial growth than those of maize starch BP. It is inferred that African Bitter Yam starch can be considered as pharmaceutical grade starch.

Key words: African Bitter Yam, *Dioscorea dumetorum*, Microbiology.

COMPARATIVE EFFICACY OF CHEMICALS IN THE CONTROL OF NEMATODES IN BANANA

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Tenekil-M (polychlorinated petroleum hydrocarbon) an indigenous compound, Furadon (carbofuran) and Rugby (Cadusafos) were applied for controlling *Helicotylenchus multicinctus*, *H. indicus*, *Hoplolaimus columbus*, *Pratylenchus coffeae*, *P. zaeae* and *Tylenchorhynchus annulatus* in banana. After the application of Tenekil-M, population of nematodes was suppressed as compared to carbofuran and Cadusafos. Tenekil-M was significantly effective than Furadon and Rugby. Average weight of the harvested bunches of banana was greater in Tenekil-M treated plants than those treated with Furadon and Rugby and the control.

Key words: Nematodes, Banana, Tenekil-M, Nematicides.

MAMMALIAN TOXICITY STUDIES OF NIMBOKIL-60 EC

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Nimbokil-60 EC, an expelled neem (*Azadirachta indica* A. Juss) seed oil based insecticide was tested to determine its mammalian toxicity. Tests for acute and percentaneous toxicity, acute inhalation, skin and eye irritation, sub-chronic effects and effect on fertility were carried out. Results revealed that 'Nimbokil' had no adverse or ill effects on the test animals under administered doses. LD-50 was found to be 16 ml kg⁻¹ body-weight of the animals. Autopsy observation showed no gross changes in vital organs i.e. heart, lungs, liver, ovary and testicles of the test animals. When applied as such (100% concentration) completely within 72 h. However, at lower concentrations, no eye irritation was noticed. It is therefore, concluded that Nimbokil-60EC be classified as non-toxic².

Key words: Neem, Nimbokil, Toxicology, Phytochemicals, Botanical pesticides.

INTER-RACIAL HETEROSIS IN MAIZE HYBRIDS

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Seventy-seven single cross maize hybrids alongwith four checks were evaluated at the NWFP Agricultural University Peshawar Research Farm during Kharif 1997 to determine the magnitude of heterosis and combining ability in elite inbred lines and to identify hybrids for commercial production. Hybrids CML40 x SY8-2 and K305 x CML66 produced the highest grain yields of 3995 and 3837 kg ha⁻¹ showing 19% and 14% heterosis, respectively, over the best check Cargill 707. The top yielding hybrids had desirable plant heights (ranging 132-166 cm) and were observed in maturity (97-100 days) at par with the local check varieties. Inbred lines CML-40 and CML-66 were identified as good general combiners for grain yield while NC-298 and SW 49-2 showed good specific combining ability for the same trait.

Key words: Maize hybrids, *Zea mays* L, Heterosis, Combining ability.

Technology

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NEW DISPERSE DYES FROM SUBSTITUTED PYRIDINES. PART-I. SYNTHESIS OF METHYL-4, 6, DIHYDROXY-2OXO-1-PHENYL-5-ARYLAZOPYRIDINE-3-CARBOXYLATE AND THEIR DERIVATIVES

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The reaction of methyl-4, 6, dihydroxy-2oxo, 1-phenyl pyridine-3 carboxylate (**iii**) with diazotized aromatic amines (**ii**), yielded compounds (**iv**) showing absorption bands between $\lambda_{\max}$ 570-590 nm, characteristic of azo dyes. An aqueous solution of (**iv**) having a non-ionic dispersing agent and a dye carrier at pH 5-6 and temperature 135°C and 75°C when applied to polyester and acetate fiber respectively furnished beautiful colours ranging from orange to yellow.

Key words: Azo dyes, Substituted pyridines, Disperse dyes, Spectroscopic studies.

Review Article

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VACUUM HEAT TREATMENT OF ENGINEERING MATERIALS; THE TECHNICAL ASPECT

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(Received 18 December 1997; accepted 19 December 2000)

In view of the rapid technological development taking place around the globe, advanced materials processing comes into sharp focus. Heat treatment in vacuum offers a plausible alternative over conventional heat treatment process as the former allows to heat treat finished parts and components with minimum surface degradation. The paper reviews various vacuum heat treating processes and their advantages over the conventional processes with specific reference to nuclear, missile and aerospace materials.

Key words: Vacuum technology, Heat treatment, Atmosphere.
