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Physical Sciences Section

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MONOSACCHARIDE COMPOSITION OF HIGH MOLECULAR WEIGHT CULTURE FILTRATE ELICITOR OF *COLLETOTRICHUM LINDEMUTHIANUM*, DETERMINED BY HIGH PERFORMANCE ANION-EXCHANGE/PULSED AMPEROMETRIC DETECTION (HPAE-PAD)

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ORGANOCHLORINE, ORGANOPHOSPHORUS AND SYNTHETIC PYRETHROID PESTICIDES AFFECTING FOOD CONSTITUTENTS IN COTTON SEEDS AND WHEAT GRAINS DURING STORAGE

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The work has been carried out to evaluate the effects of studied pesticides on food constituents in cotton seeds and wheat grains. The results are assessed using analytical data from trial applications of organochlorine, organophosphorus and synthetic pyrethroid pesticides to the aforesaid food commodities. The studied samples were stored after pesticide treatment at $(30^{\circ}\pm 3^{\circ}\text{C})$ for one month and analyzed for carbohydrates, lipids, phosphorus and trace metals in triplicate along with control samples. The data presented herein shows adverse effects on carbohydrates in samples of cotton seeds and wheat grains with pesticidal treatment while SP pesticides caused more adverse effect than OC and OP pesticides and reduced an appreciable amount of lipids in both commodities. It was also observed that phosphorus content decreased in cotton seeds and wheat grains treated with OC and SP pesticides but it increased in case of OP treatment. Lead (toxic element) was totally absent.

Key words: Pesticide affects, Food constituents, Storage.

EFFECTS OF PROCESSING ADDITIVES ON THE PROPERTIES OF NATURAL RUBBER (NSR 20)

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Commercial sample of unprocessed natural rubber (polyisoprene) NSR 20 compounded into base polymer was processed into sheets using various vulcanizing and plasticizing additives. Physical testing of the vulcanized rubber samples was carried out on an Instron testing machine for tensile properties. Tests were also carried out to assess the effects of plasticizer additives on the rheological properties of the processed rubber. Tensile strength and modulus at break % increase steadily with increase in sulphur level up to 5 pphr (parts per hundred rubber) and fall gradually when sulphur level exceeds 10 pphr but elongation at break decreases accordingly. Dioctysebaccate (DOS) and Dioctyladipate (DOA) are quite effective as plasticizers in reducing the viscosity, T_g (glass transition temperature) and hardness of the rubber while Dibutoxylethoxylethyladipate (Bisoflex III) is less effective.

Key words: Natural rubber, Viscoelasticity, Vulcanization, Plasticization.

A STUDY OF DEVIATION FROM LOCAL THERMODYNAMIC EQUILIBRIUM IN THERMAL PLASMAS BY OPTICAL EMISSION SPECTROSCOPY

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A fast, accurate and comprehensive optical emission spectroscopic set-up has been employed to investigate the deviation from local thermodynamic equilibrium in a 75- ampere argon plasma arc. The H_{β} and H_{α} lines of hydrogen were monitored with a spectrograph while an Ar I line and its neighbouring continuum were simultaneously monitored with a monochromator. The electron number densities calculated from Stark-broadened H_{β} and H_{α} lines of hydrogen were compared with those derived from absolute intensity measurements of the 7635 Å Ar I line. The H_{α} line showed an order-of-magnitude higher number density than LTE measurements; the H_{α} results are generally known to be inaccurate because this line is self-absorbing and its refined Stark-broadening parameters have not been calculated. The H_{β} line is usually the first choice for Stark-broadening calculations; its theory is well developed, and results are expected to be accurate within 10%. Results from the H_{β} line turned out to be about 4 times higher than LTE results. This difference is attributed to two possible reasons: first, the strong Ar I line also suffers from self-absorption and second, there may be a considerable deviation from LTE.

Key words: Local thermodynamic equilibrium, Plasma arcs, Emission spectroscopy.

MEASUREMENT OF RADON CONCENTRATION LEVELS IN OLD BUILDINGS OF LAHORE, PAKISTAN

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Radon concentration was measured in old buildings of Lahore, Pakistan having ages between 66-321 years by using CN-85, nuclear track detectors. The maximum value of radon concentration is found to be 69.4 Bq m^{-3} in General Gallery of Lahore Museum, while in the Officers' rooms of GPO, Lahore, it is minimum i. e. 20 Bq m^{-3} which may be attributed to the use of paints in these rooms. Other factors which influence radon concentration are the ventilation condition of the old buildings and the radon emanation from the building materials and articles inside the buildings.

The internal doses in terms of effective dose equivalent (mSv y^{-1}) due to potential alpha energy concentration (WLM) from radon progeny has also been estimated. The estimated effective dose equivalent to bronchial tissue has been found very much below to that of ICRP limit of 20 mSv y^{-1} to limit the probability of lung cancer.

Key words: Radon concentration, Old buildings, CN-85 nuclear track detectors.

Short Communication

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ESTIMATION AND COMPARISON OF Q-e PARAMETER OF METHYL METHACRY- LATE AND ACRYLAMIDE COPOLYMER- IZED WITH STYRENE IN THE PRESENCE OF CYCLOHEXANONE AND METHYL CYANOACETATE

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Biological Sciences Section

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WHEAT (*TRITICUM AESTIVUM* L.) STAND ESTABLISHMENT IN LEGUME AND NON-LEGUME BASED CROPPING SYSTEMS

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Wheat stand establishment behaviour was studied in different cropping systems under rainfed conditions, during 1992-94. On the basis of wheat emergence (m^{-2}) and emergence rate index, two distinct groups of cropping systems were observed. The first group included fallow-wheat, mashbean-wheat, mungbean-wheat and cowpea-wheat systems whereas the second included maize-wheat, sorghum-wheat, millet-wheat, sunflower wheat and soy bean-wheat systems. Wheat stand establishment was significantly ($P<0.05$) higher in the first group than in the second group. In Rabi 1992-93 wheat emergence was completed in a short period and emergence rate index was higher than that for 1993-94 due to dry weather. Overall, there was significantly ($P<0.05$) better residual soil moisture (0-15 cm layer) in fallow-wheat, mashbean-wheat, mungbean-wheat and cowpea-wheat cropping systems than other systems under study during both the years.

Key words : Cropping systems, Rainfed conditions, *Triticum aestivum* L., Leguminous plants.

ION EFFLUX IN COTTON ROOTS AT DIFFERENT STAGES OF DEVELOPMENT AND TEMPERATURE REGIMES

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Cotton seeds were germinated in incubator for 48 and 60 h. The root radicles were divided in several groups. In one group, the roots were separated into two equal halves i.e. proximal and distal, in another group they were separated as long and short roots. These tissues were incubated at 35°C to analyse the electrical conductivity. In another experiment 48 and 60 h old root radicles were incubated at 30, 35 and 40°C to measure the electrical conductivity. Distal parts of roots released more electrolytes than proximal parts and short roots effluxed more electrolytes than the long roots. The 48 h old roots effluxed about double the electrolytes than 60h old roots.

Key words: Cotton roots, Electrical conductivity, Ion efflux.

PRELIMINARY STUDIES ON THE POPULATION OF PHYTONEMATODES WITH BETLEVINE (*PIPER BETLE*) AND THEIR CONTROL BY INDIGENOUS NEMATICIDE

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Two nematicides viz. Furadan and Tenekil-M were tested for their efficacy against phytoparasitic nematodes i.e. *Helicotylenchus indicus*, *H. digonicus*, *Hoplolaimus indicus*, *Rotylenchus reniformis* and *Longidorus siddiqui* that are attacking betlevine. After 16 weeks of the experiments the number of these nematodes was reduced in treated plots than control. Tenekil-M was found to be a good nematicide. The nematicide is indigenous and economical for betlevine industry.

Key words: Plant parasitic nematodes, Furadan, Tenekil-M.

Short Communication

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TRACE ELEMENTS IN *TAMARINDUS INDICA*-LINN AND THEIR NUTRITIONAL IMPORTANCE

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Tamarindus indica Linn, locally known as Imli, (Caesalpiniaceae) is found almost everywhere in India and Pakistan (Nadkarni 1954). Its fruit is an important item of diet. (Chopra *et al* 1956; Dymock 1972).

Ripe fruit pulp of *T. indica* is rich in sugars like D. glucose

Technology Section

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HYDROTHERMAL CRYSTALLIZATION AND CRYSTAL GROWTH OF α -SiO₂ FROM RICE HUSK SILICA ASH IN ALKALINE SOLUTIONS

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White pure and active amorphous silica was prepared from rice husk with 99.96% purity by acid leaching and pyrolysis. This silica could be crystallized into prismatic microcrystalline α -SiO₂ (77-88nm) under hydrothermal conditions (215 °C $\approx$ 20 atm. press.) from alkaline solutions. The maximum yield of α -SiO₂ was obtained at 0.6 molar ratio of NaOH / SiO₂ which reduced to 0.2 in the presence of Al³⁺ and /or B³⁺ traces. This is due to the formation of silicalite crystals (considered to be a polymorph of SiO₂). It has been found that transition metal cations in the reaction media affects the degree of α -SiO₂ crystallization in the order: Fe³⁺ > Ni²⁺ > Cr³⁺ > amorphous SiO₂ > Co²⁺ > Cu²⁺ > Mn²⁺ > Zn²⁺ > Zr⁴⁺ > La³⁺. Both mechanism of α -SiO₂, silicalite growth and ions incorporation were discussed.

Key words: Rice husk silica, α -SiO₂, Silicalite, Crystal growth, Hydrothermal, Microstructure.

