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Physical Sciences Section

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GROUP CALIBRATION OF MASSES
Part I. Masses of Denomination 10, 5, 2, 2′, 1′, Kg

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Some basic aspects of calibration of the working standard masses have been explained. The system of group weighing, formulation of least square equations and calculations of the mass values of the unknown masses in terms of the certified reference standard 1 kg mass have been illustrated. It has also been shown how the different types of variance, standard deviation and uncertainties can be determined from the systematic uncertainty of the reference standard and the random errors of measurement.

Keywords : International system, Calibration, Least square solution.

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THERMODYNAMIC STUDIES ON STYRENE BUTADIENE PHENOLFORMALDEHYDE CATION EXCHANGE RESIN

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(Received October 7, 1987 ; revised July 14, 1988)

Ion-exchange equilibrium reactions between Ca^{+2}, Sr^{+2} and Ba^{+2} and sodium - form of styrene butadiene Ph-formaldehyde cation exchange resin (SBPF) over the temperature range $25^{o} - 45^{o}$ in aqueous and aqueous-acetone have been investigated. Thermodynamic equilibrium constant K_{th} is greater than unity over the entire temperature range, and increase with increasing of temperature. The thermodynamic functions $\triangle F^{o}$, $\triangle H^{o}$, and $\triangle S^{o}$ have been calculated for this exchange at each solvent compositions. The variation of these functions in mixed solvent have been shown to be controlled by the entropy $\triangle S^{o}$ changes, where $\triangle H^{o}$ controls the selectivities in aqueous medium. Moreover, $\triangle S^{o}$ changes increase with increasing of both the heat of exchange and solvent compositions.

Key words: Cation exchange resin, Ion exchange resin, Selective studies, Thermodynamic studies.

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MINIMUM FLUIDISATION VELOCITY IN PACKED -FLUIDISED BED REACTORS

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(Received December 17, 1985; revised June 30, 1988)

An experimental determination of the velocity of minimum fluidisation of cylinder-packed fluidised bed reactors has been made. Two columns of equal lengths but of different diameters were employed. The columns were charged with three sizes of cylindrical packings and five grades of sand. The fluidising medium was air.

The experimental results on velocity of minimum fluidisation were compared with the values available from literature for conventional fluidised beds.

Key words: Minimum fluidisation velocity, Interstitial fluidisation, Pressure drop.

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AMINOAZOLES IN HETEROCYCLIC SYNTHESIS
Synthesis of some pyrrolo Heterocycles+

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(Received September 17, 1987; revised July 20, 1988)

Condensation of 4-carbomethoxy-2,3-dioxopyrrolidines [1] with aminoazoles gave the linearly fused pyrroloheterocycles [2-6]. The structure of the hitherto unknown ring systems have been established by analytical and spectral data.

Key words: Aminoazoles, Pyrroloheterocycles.

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SYNTHESIS AND ANTIMICROBIAL TESTING OF 2-AMINO-4- (*p*-FLUORO-*m*-NITROANILINO) -6-SUBSTITUTED-*s*-TRIAZINES

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(Received May 22, 1988; revised August 8, 1988)

1 – (*p*-Fluoro-*m*-nitrophenyl) biguanide (I) was treated with diethyl oxalate to obtain 1-(*p*-fluoro-*m*-nitrophenyl)-3-(4, 5-dioxo-2-imidazolidinylidene) guanidine (II) as intermediate, which upon treatment with alcohols or amines afforded 2-amino-4-(*p*-fluoro-*m*-nitroanilino)-*s*-triazine-6-carboxylic acid esters ($III_{a,b}$) and acid amides (IV_{a-d}) respectively. Treatment of I with ethyl formate or ethyl cyanoacetate gave 2-amino-4-(*p*-fluoro-*m*-nitroanilino)-*s*-triazine (V) and its 6-acetonitrile derivative (VI). Coupling of VI with *p*-alkoxy-*o*-nitrophenyldiazonium chlorides yielded the corresponding azo derivatives ($VII_{a,b}$). All compounds have been tested against *Staph. aureus, Pseudomonas aeruginosa* and *Candida albicans*. Compounds $III_{a,b}$ exhibited a significant bactericidal activity.

Key words: *s*-Triazines, Biguanides, Synthesis.

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SYNTHESIS OF CERTAIN 1, 3,4-OXADIAZOLES, 1,2, 4-TRIAZOLES AND 1,3,4-THIADIAZOLES AS POTENTIAL CHEMOTHERAPEUTIC AGENTS

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(Received March 27, 1988; revised August 21, 1988)

A series of five membered heterocyclics namely, 5-substituted-4-acetyl-2-(2-chloro-4-nitrophenyl)-1,3,4-oxadiazolines 6-10, 4-substitutedaminomethyl-2-(2-chloro-4-nitrophenyl)-1,3, 4-oxadiazoline-5-thiones 12-15, 2-substituded-5-(2-chloro-4-nitrophenyl)-1, 3, 4-oxadiazoles 22-27, 4-substituted-3-(2-chloro-4-nitrophenyl)-5-phenyl-1, 2, 4-triazoles 28-30, and 2-substitutedamino-5-(2-chloro-4-nitrophenyl)-1, 3, 4-thiadiazoles 36-40 , were synthesized. Eight representative compounds were tested for their *invitro* antimicrobial activity against some pathogenic microorganisms, some of them were proved to be active.

Key words: Synthesis, Antimicrobial testing, 1,3,4-Oxadiazoles, 1,2, 4-Triazoles, 1,.

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POLAROGRAPHIC BEHAVIOUR OF SOME METAL IONS IN PRESENCE OF PYRUVATE

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(Received June 19, 1988)

The polarographic reduction of Bi^{III}, Fe^{III} Hg^{II}, Cu^{II} and UO_2^{II} at the dropping mercury electrode has been investigated in pyruvate solution. A single reduction wave has been observed with each metal ion. It has been proved that pyruvate forms complexes of the type 1:1 and 2:1 ligand to metal ratio with Fe^{III} and UO_2^{II} and 1:1 ligand to metal complexes with Bi^{III}, Hg^{II} and Cu^{II}. The stability constants have been determined. The effect of pH, the nature of the electrode process and the reduction mechanism have been discussed. The stoichiometry of the complexes has been confirmed by conductometric titration.

Key words: Polarographic reduction, Pyruvate-metal ion complexes, Polarographic behaviour.

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LEAD-ZINC ORE OF KOHISTAN, HAZARA, PAKISTAN

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The Kohistan Pb-Zn mineralization occurs as veins and disseminations of sphalerite, galena and pyrite in Besham at a distance of about 150 km from Abbottabad. Igneous and metamorphic rocks are the main rocks exposed in this geologically complex area. The petrology, chemical and X-ray studies reveal that the major minerals are quartz, galena and sphalerite with minor chalcopyrite.

Key words: Pb-Zn mineralization, Kohistan, Hazara, Pakistan.

Biological Sciences Section

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A STUDY OF THE MICROBIOLOGICAL ASPECTS OF COMMERCIAL AND DOMESTIC FROZEN BEEF AND BEEF PRODUCTS

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(Received March 6, 1988; revised August 21, 1988)

Frozen beef and beef products purchased from six selected stores of three different localities of the Lahore city were investigated for microbial contamination and compared with those frozen at -18^{o} in the laboratory for acceptable standards. Total viable counts and coliforms were examined. The results showed that some of the market meat products such as Shami Kabab and Samosa samples were contaminated with coliforms; the counts being higher than the values reported for the frozen meat and meat products. The observed microbial load in some of the market products could be attributed to (i) inadequate freezing techniques (ii) unhygienic handling practices and (iii) the contaminated spices and additives. The storage temperature of about -18^{o} was found quite suitable for storing beef and beef products for at least two months.

Key words: Beef, Freezing, Microbiology.

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ALKALINE OXIDATION VALUE AS INDICATOR OF ADULTERATION OF SCENTED BASMATI RICE WITH NON-SCENTED RICE VARIETIES

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(Received May 7, 1988; revised August 11, 1988)

Preliminary studies on alkaline oxidation values of scented and non-scented rice varieties suggested that alkaline oxidation value could be used to detect adulteration of Basmati rice with cheaper and similar non-scented varieties of rice.

Key words: Alkaline oxidation value, Basmati rice, Adulteration.

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STUDIES ON ORGANIC FERTILIZING POTS

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(Received May 30, 1988; revised August 3, 1988)

Considering the heavy losses of plants and growth set-back during transplantation as well as the availability of agro-wastes, organic fertilizing pots were prepared and experiments conducted. The main ingredients for various sets of pots included different composts, biogas slurry and cowdung manure. The binding materials used included wheat hull, paper pulp, dried and chopped reed plants and clay.

The results of comparative efficiency of different sets of pots have been represented by three tables. A histogram has also been provided to show the comparative growth of plants in different categories of pots after a period of six months. The fertilizing pots made from American and Chinese composts as well as biogas slurry were found more effective as compared to those made from Indian compost and cowdung manure. In control pots the plants were stunted, yellowish in colour and undernourished.

Key words : Organic, Fertilizing, Pots.

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THE INFLUENCE OF SIMULATED SOIL EROSION AND RESTORATIVEFERTILIZATION ON MAIZE AND WHEAT PRODUCTION

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(Received October 20, 1987; revised July 24, 1988)

Few attempts have been made to identify the yield limiting effect of soil erosion/desurfacing. The objective of this study was to determine the effect of moderate desurfacing on the yield of crops and restore the reduction in yield with the application of fertilizers. Maize and wheat yields were reduced by 50 and 51% respectively due to desurfacing. These losses were restored with the application of fertilizer 150-100 kg NP/ha for maize and 90-60 kg NP/ha for wheat. Lower yields under desurfacing are attributed to poor fertility status and available water holding capacities (AWHC).

Key words: Soil erosion, Productivity, Fertilization.

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SALT-TOLERANCE POTENTIAL OF WILD RESOURCES OF TRIBE *TRITICEAE*
Part I. Screening of Perennial Genera

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(Received May 26, 1988, revised August 15, 1988)

The comparative salt tolerance potential of previously unscreened accessions of 19 species belonging to five different genera of the tribe *Triticeae* were tested to identify the high salt tolerant genotype to be utilized in hybridization programme. The screening was done in 254 cm x 82 cm x 23 cm cemented tanks filled with gravel and Hoagland nutrient solution. Salinity was created by mixing $NaSO_4$, $CaCl_2$, $MgCl_2$ and NaCl in the ratio of 10:5:1:4 and induced by a stepwise increase in electrical conductivity (EC) reaching of a maximum of 54 dS m^{-1}. Observations on plant height; no. of leaves per plant and no. of tillers per plant were recorded twice a week. Differences with respect to salinity tolerance were observed between and within the genera; *Thinopyrum* and *Leymus* were the most salt tolerant. This paper describes in detail the comparative morphology of salt tolerant and sensitive plants under saline conditions. The interspecific and intergeneric variability and the potential of tolerant species for crop improvement is also discussed.

Key words: Salt tolerance, *Triticeae, Thinopyrum* species, *Leymus* species, Hybridization.

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ON THE EFFECT OF COTTON WASTE COMPOST, ZARKHEZ AND COWDUNG MANURE ON SUNFLOWER YIELD

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(Received May 5, 1988; revised August 15, 1988)

Cotton waste compost at 5 kg/9 m^2 area when applied to sunflower plants prior to sowing resulted in 19.5 % increase in number of germinated seeds. Combination of cotton waste compost and cowdung manure (1 : 1), however, resulted in 25.5 % increased germination as compared to control. Maximum yield of sunflower seeds and its oil content was obtained from plants grown in plots with cotton waste compost. Test of significance among various treatments indicated that effectiveness of cotton waste compost was significantly above other treatments both at 5 % and 1 % level of probability. Cotton waste compost, therefore, seems to be a better fertilizer for crops and can be used in place of cowdung manure and other fertilizers.

Key words: Cotton waste compost, Zarkhez, Cowdung manure, Sunflower.

Short Communication

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AGRO-CHEMICAL DATA ON *CUCURBITA PEPO*

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In order to identify and maximise the available vegetable oil resources a number of approaches have been adopted in recent years. Introduction of new or non-traditional sources, evaluating the existing non-conventional sources, modifying the processing techniques for better recovery of oil and exploitation of the forest and agriculture bye products and wastes are some of the examples [1]. All these steps are aimed at reducing the import gap of vegetable oils (0.8 million tons/yr) which is steadily increasing because of population increase (about 3.0%/yr) and almost static local production (0.2 million tons/yr). Efforts have, given in Table 1. The oil yield (40%) from the pumpkin seeds compares well with rape seed (40%-45%). ground nuts (45-48%) and sunflower (35-45%). The characteristics of the oil and its fatty acid composition (Table 2) is similar to other *Cucurbitaceae* seed oils and suggests that it can safely be used as an edible oil [4]. Utilisation of such oils for industrial and edible purposes elsewhere in fact has already been reported. [3].

Because of the shortage of edible oils in Pakistan even such meagre sources be considered for effective utilisation. Efforts should also be directed to develop a variety of the

Table 1. Eco. meterological data for the cultivation of *Cucurbita pepo*

Technology Section

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DETERMINATION OF GOLD BY RING-OVEN TECHNIQUE

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(Received February 9, 1986; revised August 11,1988)

A method based on Weisz Ring-Oven Technique is reported for the determination of gold with ascorbic acid in alkaline media. It is, quick precise and sensitive method ranging from 0.2 ug to 2.0 ug/ul of gold with maximum error of 5.0%. The effect of diverse ions has also been studied. Some of the interferences were removed by using suitable masking agents. The method has also been applied to rock samples, which gives reasonably precise results. Thus the method is suitable for routine analysis of gold.

Key words: Telluride mineral, Determination of gold, Hard rock deposits.

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STUDIES ON DESIGNING A PILOT PLANT FOR THE PRODUCTION OF DETOXIFIED GUAR MEAL AND GUAR GUM FROM GUAR SEEDS (*C. PSORALIOIDES*): PHYSICO-CHEMICAL CONSTANTS

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(Received March 5, 1988; revised August 21, 1988)

Guar gum and guar meal produced by five industrial concenrs of Pakistan, from guar seeds goes waste due to presence of toxic substance saponin that makes it unfit for human/animal use. The experiments conducted on the extraction of gum and detoxified guar meal were on a small laboratory scale. In the present study some useful parameters. for designing and fabrication of pilot plant have been investigaged fo large scale production of guar gum and detoxified guar meal for human consumption.

Key words: Detoxified guar meal and guar gum.

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ELECTROLESS PLATING OF NICKEL ON ALUMINIUM

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In the present investigation studies have been carried out for the electroless plating of nickel on aluminium. A suitable bath which consists of nickel sulphate, lactic acid, sodium hypophosphite and tartaric acid has been selected. This bath gives reasonably thick, adherent and flexible coating of nickel on aluminium. The bath is workable at 80° when its pH was maintained at 8. The immersion time for the plates was thirty minutes.

Key words: Electroless plating, Nickel, Aluminium.

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THE CHANGES IN COMPOSITION AND PROPERTIES OF DIRECTLY AND INDIRECTLY PROCESSED UHT MILK DURING STORAGE

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(Received March 9, 1988; revised July 27, 1988)

The attained results showed that a slight decrease occurred in pH, viscosity, fat, lactose, total ash and some minerals of directly processed UHT milk, whereas, the acidity values slightly increased. Stability to ethanol was the same in milk samples stored for their expiry date (4 mon.) at different temperatures (5 ± 1^{O}, 15 ± 7^{O} and 30 ± 0.5^{O}). The same was observed for indirectly processed UHT milk samples with exception that a great loss was recorded in the fat and lactose contents as well as the stability to ethanol for milk samples stored at 15 ± 7^{O} and at 30 ± 0.5^{O}. In all UHT milk samples total N, case in N gradually decreased during storage, whereas non-casein N and non-protein N increased to a great extent in samples stored at higher temperatures. Storage at high temperature caused undesirable effects on colour and appearance of UHT milk.

Key words: UHT milk, Composition, Properties, Storage.