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SOLVATION EFFECT OF AROMATIC DILUENTS ON THE CATIONIC POLYMERIZATION OF STYRENE

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Cationic polymerization of styrene in benzene, toluene and xylene has been carried out at 10-12° using anhydrous $AlCl_3$ as the catalyst. The efficiency of propagating species in different aromatic diluents has been found in the following order. Xylene > toluene > benzene. Diluents help not only the initiation of cationic polymerization of styrene, but also partially serve as chain transfer agent. The molecular weight of the polymer, degree of polymerization, chain transfer constant and monomer transfer constant may vary diluent to diluent. The values of chain transfer constant measured for benzene, toluene and xylene are respectively 8×10^{-3} , 14×10^{-3} and 30×10^{-3} . The value of monomer transfer constant determined for styrene is 10×10^{-3} .

Key words : Diluents, Dielectric constant, Monomer chain transfer constant.

EFFECT OF THE ANODIZATION CURRENT DENSITY AND TIME ON THE CORROSION OF Al AND Al-Mn ALLOY

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Al and Al-Mn alloy were anodized in 1.0 M solution of sulphuric, oxalic, citric and tartaric acids at various current densities (0.5-2.50 a.dm^{-2}). It is found that, the inhibition property of the anodic films on both Al and Al-Mn increased with increasing the current density. The effect of current density is greater in case of citric and tartaric acids. The effect of time was studied in 1.0 M acid solution at 1.0 a.dm^{-2} and time intervals of 10-60 minutes. Increasing the time accompanied with a decrease in reaction number. The results were treated applying both of Tafel equations and the mathematical treatment suggested earlier by us.

Key words Corrosion, Al-Mn alloy, Anodization, Aluminium.

VOLUMETRIC AND ULTRASONIC BEHAVIOUR OF BINARY MIXTURES OF N, N-DIMETHYLFORMAMIDE WITH SOME CHLOROETHANES AND CHLOROETHENES

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Excess Volumes (V^E) and deviations in isentropic compressibilities (K_s) were reported for the binary liquid mixtures of N, N-dimethylformamide (DMF) with 1, 2-dichloroethane, 1, 1, 1-trichloroethane, 1, 1, 2, 2-tetrachloroethane, trichloroethene and tetrachloroethene over the entire mole fraction range at 303.15°K. The values of V^E and K_s are positive for the system, DMF + 1, 2-dichloroethane and negative for the systems, DMF + 1, 1, 1-trichloroethane and + 1, 1, 2, 2-tetrachloroethane. For DMF + trichloroethene, the values of V^E are negative and an inversion in sign of K_s from positive to negative is observed. The V^E values for the system, DMF + tetrachloroethene, are negative and K_s values are positive. The experimental data were used to explain the effect of successive chlorination and unsaturation of ethane molecule on V^E and K_s .

Key words: Excess volumes, Sound velocity, Density.

EQUILIBRIUM INTERACTION OF THE SOLUTE SPECIES ENTERING INTO THE HOLES OF A SOLVENT BODY

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With the discovery of interstitial compounds and various other observations along with the advancement of theories on the nature of the solvents one is led to suspect the presence of ordered structure of liquids having some unoccupied spaces, referred to in this paper as "holes". It is possible that very minute quantities of solute species of tolerably small size temporarily occupy some of these "holes". The duration of such occupation may be attained with some distortions of both solvent holes and the solute species depending on the polarizability and structural differences of the components. A theoretical framework has been constructed where it is shown that a plot of V/V_S versus $S/V_1 - V_S$ will give a straight line at the lower end of concentrations, where V , S , V_S and V_1 are molar volume of solute, molar volume of solvent, apparent molar volume and molar volume of monomer respectively. The slope of this plot is $K\beta$ and the intersection is K/V_1 , where K is the equilibrium constant and β is the number of moles of "holes". Hence K and β can be found out.

Key words: Equilibrium interaction, Solute species holes.

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RING EXPANSION REACTIONS OF TRICHLOROMETHYL RADICALS WITH PYRAZOLES AND THE EFFECT OF SUBSTITUENTS ON THE YIELD

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(Received November 6, 1988; revised May 16, 1989)

Vapour phase reactions of carbon tetrachloride with substituted pyrazoles in a flow system at 550° provide a convenient method for ring expansion. Effect of increasing the number of electron donating methyl group on the nature of products and the over all yields was investigated. An increase in the overall yield of the reaction products (75%) was observed while the presence of a benzene ring decreased the yield. Results were compared with those obtained from the reactions of chloroform and substituted pyrazoles under identical conditions.

Key words : Ring expansion, Trichloromethyl radicals pyrazoles, Effect of substituents.

Short Communication

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VISCOSITY AND THERMODYNAMIC PROPERTIES DATA FOR METHANOL AND BENZENE MIXTURES AT ELEVATED TEMPERATURES (FOR TWO EXTREME CONCENTRATIONS)

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EFFECT OF DIETARY CARBOHYDRATE OF DIFFERING MOLECULAR COMPLEXITY ON THE TILAPIA (*SAROTHERODON MOSSAMBICUS*)

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(Received February 15, 1989; revised April 17, 1989)

Feeding trials were carried out on Tilapia. Experimental diets containing glucose, sucrose, dextrin, starch and α -cellulose at three different levels (10, 20 and 40 %) were given to the fish for eight weeks. Growth improved as the inclusion level of carbohydrate increased from 0 % to 40 %. There was significant correlation between carcass fat and condition. At the 40 %, inclusion level, protein retention was highest on dextrin and starch and lowest on the glucose diet. At 20 % glucose spared more, and at 40 % spared less protein energy in the diet than dextrin starch or sucrose at corresponding levels. The effect of these carbohydrates for substituting protein energy in feed for tilapia is discussed. Inclusion levels were adjusted with polypropylene powder. As α -cellulose was increased from 0 % to 40 %, growth, FCE, NPR, carcass fat and condition factor declined and were lower than in control fish. The negative physiological effect of α -cellulose as an inert bulking agent in fish feed is discussed.

Key words: Carbohydrate, Molecular complexity, Tilapia.

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CYTOMIXIS AND MEIOTIC ABERRATIONS IN TWO SPECIES OF *ABUTILON* MILL FROM PAKISTAN

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(Received December 26, 1988; revised April 30, 1989)

Cytomixis and meiotic aberrations have been reported in *Abutilon grandifolium* (Wild.) Sweet and *A. pannosum* (Forst. f.) Schelecht. from Pakistan. Cytomixis was observed in the two species includes migration of chromatin matter to entire chromosomes or whole nucleus. The meiotic aberrations such as laggards, uni – or multivalents, multinucleate PMCs; curved, open, triangular, multipolar, or multiple spindles; incomplete tetrad or polyspory, observed in the two species are attributed to their cytotoxic behaviour.

IMPACT OF AIR POLLUTION OF VEGETATIVE GROWTH (*GUAIAECUM OFFICINALE*) IN KARACHI

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(Received November 26, 1988; revised May 10, 1989)

Data on ecological parameters like leaf area, its dry matter, senescence, flowering and fruiting of *Guaiacum officinale* have been recorded for two years to quantify the impact of air pollution due to vehicular exhaust emissions at 20 traffic congestion points in Karachi. It has been found that the Grumandir site is seriously affected with respect to leaf area, dry weight and senescence while at Nazimabad and Tariq Road the impact is high with regard to flowering and fruiting. The plants at Karachi University are least affected. There is a 40% reduction in leaf area at highly polluted spots. The dry weight of the leaves is more sensitive to pollution and is noted to decrease with increase in the degree of pollution. Flowering of elder plants at the polluted sites spanned over 5 to 6 months, while at the least polluted spots they did not do so only in January and February. Also at the former spots the falling of leaves had since been completed in the third week of February when the process had just started at the latter station. The observed impact of air pollution seems to suggest a relation with early aging of plants. The observed stunted growth is suggested to be due to reduction in cell wall extensibility and for reducing the degree of hydration and early maturity of the leaves. The dehydration conditions created by the hydrophobic macro-environment of the pollutants alter the micro-environment of the plants and lead to the so called invisible injury or early aging.

Key words: Air pollution, Vegetative growth, *Guaiacum officinale*, Aging, Micro-environment.

STUDIES ON THE CONSTITUENTS OF ACACIA ARABICA PREMATURE PODS

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(Received February 4, 1989; revised May 18, 1989)

Chemical analysis of *Acacia arabica* premature pods have been investigated. The analysis of the pods showed that they obtained in term of dry weight 47.75% carbohydrate, 1.67% protein, 1.41% lipid, 6.37% crude fibre and 8.55% ash. The moisture content was found to be 34.26% in term of wet weight. The mineral elements were found to be 126.97 mg sodium, 14.96 mg potassium, 159.54 mg calcium, 307.80 mg magnesium and 342.0 mg phosphorus.

The chromatographic analysis of ethylalcohol-water (90:10 v/v) extract showed that it contains glucose/galactose, fructose, maltose, aspartic acid, glutamic acid, glycine, alanine, proline, leucine and threonine.

Key words: Premature *Acacia arabica* pods, Minerals, Free sugars and amino acids.

REACTION OF TWO CULTIVARS OF MAIZE (*ZEA MAYS* L.) TO STUNT NEMATODE, *QUINISULCIUS CURVUS*

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(Received February 20, 1989; revised May 27, 1989)

The effect of the stunt nematode, *Quinisulcius curvus* (Williams, 1960) Siddiqi, 1971, on growth parameters of two maize cultivars, Kashmir Gold and Pirsabak, was studied. The results showed cultivar Pirsabak growth to be adversely affected by this nematode at 100, 200 and 400 inoculum levels. With Kashmir Gold, only the 400 inoculum level had an adverse effect and this was on shoot and root length only.

Key words: Stunt nematode, *Quinisulcius curvus*, Maize, Pathogenicity.

EFFECT OF DIFFERENT CROPPING SEQUENCES OF N UPTAKE AND PRODUCTIVITY OF SUCCEEDING WHEAT CROP*

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(Received September 7, 1988; revised April 29, 1989)

Residual effects of six cropping sequences including various legumes were examined with respect to N uptake and productivity of succeeding wheat crop. The results showed that all the preceding treatments except soybean (*Glycine max*) stimulated and enhanced the productivity of subsequent wheat crop significantly as compared to preceding cotton crop. Among various preceding treatments green manure with clusterbean (*Cyamopsis tetragonolobus*) was more potent in improving grain yield and N uptake followed by fallow and pigeon pea (*Cajanus cajan*), respectively.

Key words: Residual effects, *Cyamopsis tetragonolobus*, *Cajanus cajan*, *Glycine max*, Fallow, *Triticum estivum*.

EFFECT OF SOIL SOLARIZATION ON THE REDUCTION IN VIABILITY OF SCLEROTIA OF *MACROPHOMINA PHASEOLINA* AT DIFFERENT FIELD LOCATIONS

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(Received on February 22, 1989; revised on June 13, 1989)

The effect of soil solarization on the viability of sclerotia of *Macrophomina phaseolina* was tested at 3 different field locations viz., Karachi, Sakrand and Lahore during the hot summer month of June, 1984. A 7-day mulching of soil artificially infested with *M. phaseolina* reduced sclerotial viability by 98-100 % and considerably reduced *Macrophomina* infection on sunflower used as a test plant. Loss in viability was related to the rise in soil temperature. The maximum temperature attained in wet soil after mulching was 54° compared with 42° in non mulched treatments. An increase in organic matter, pH, potassium, phosphorus and a decrease in nitrogen occurred in solarized as compared with non-solarized soil.

Key words: Soil solarization, Polyethylene mulching, *M. phaseolina*.

EFFECT OF DETOXIFIED FEED ON THE PERFORMANCE OF BROILER CHICKS

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(Received October 18, 1988; revised May 2, 1989)

One day old broiler chicks (Hubbard) numbering 120 were fed on control, control ammoniated, contaminated 500 µg/kg aflatoxin and decontaminated rations for eight weeks showed weight gained 1641, 1916, 1345 and 1734 gm and feed efficiency values were 2.87, 2.53, 3.59 and 2.85 respectively. Mortality percent was higher with contaminated diet. Significant differences were observed regarding weight gain feed efficiency, dressing percentage and liver weights. Livers with haemorrhages were observed with contaminated feed. Ammoniation of feed improved feed efficiency and lowered the chances of haemorrhages and mortality. Blood picture values showed non-significant differences.

Key words: Aflatoxin, Detoxification, Nutritive value.

Short Communication

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**CULTIVATION CONDITIONS AND PHYSICO-CHEMICAL EVALUATION OF *CUCURBITA*
MAXIMA AND *CUCURBITA MOSCHATA* SEED OILS**

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Short Communication

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RHIZOSPHERE MYCOFLORA OF SOME CULTIVATED FERNS

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Technology Section

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PREPARATION OF ALUMINA FROM BAUXITE

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Preparation of alumina from Khushab bauxite has been examined by calcination process. The indigenous bauxite was evaluated for its mineralogical and chemical composition and its subsequent utilization as aluminium ore. Alumina of metallurgical grade was prepared on calcination with sodium carbonate. Various parameters for maximum recovery of alumina was observed with thermal treatment at different time intervals, temperature, and suitable ratio of reactions. Effect of particle size on the maximum extraction of alumina from bauxite have also been studied. The reaction is considered suitable for large scale production of alumina from bauxite.

Key words. Alumina, Bauxite, Sodium carbonate.

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DETERMINATION OF GERMANIUM IN ORIGINAL, UP-GRADED KOTLI COAL AND ITS TAILINGS

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(Received March 3, 1987; revised May 15, 1989)

In a Kotli coal sample, with 30 % ash, germanium was found up to 8.1 $\mu\text{g/g}$. Coal was up-graded by the froth flotation technique using ethanalamino-oleate as a flotation agent. The up-graded sample with 13 % ash, contained germanium up to 6.6 $\mu\text{g/g}$. In the tailings, which contain 37 % ash germanium was found up to 11.4 $\mu\text{g/g}$. Thus extraction of germanium from tailings is considered more economical, as germanium was shown to be concentrated in the mineral matter.

Key words: Germanium, Coal, Tailings.

INTRODUCTION

have determined germanium in rocks using both phenyl-

STUDIES ON SODA-SULPHUR PULPING

Part IV. Pulping of Jute-stick by Soda-sulphur Process

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(Received December 5, 1988; revised May 10, 1989)

Stronger pulps with higher yields in relatively short cooking time are obtained by application of soda-sulphur process in case of rice [1] and coconut rib [2], similar results have been obtained in case of jute-stick with the application of elemental sulphur to the cooking liquor consisting of sodium hydroxide solution. The jute-stick soda-sulphur pulps thus produced is a good source of making writing and printing papers.

Key words: Soda-sulphur, Jute-stick, Pulping.

STUDIES ON BIOCONVERSION***Part IV. On the Efficiency of "Bitumen-Drum" Made Portable Unit for Biogas Generation***

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(Received October 6, 1987; revised April 30, 1989)

Efficiency of a unit fabricated from used bitumen drums for biogas generation was investigated with buffalo dung as feed material. It was observed that 8-10 % solid content and loading rate of 12 kg. buffalo dung feed per day yielded 0.037-0.039 m³ gas/kg. buffalo dung in summer and 0.027-0.029 m³ gas/kg. buffalo dung in winter with 33 % CO₂. This biogas unit has an advantage that it is portable, can be moved from place to place, low in cost, easy to construct, operate and clean and quite durable.

Key words: Portable unit, Biogas, Buffalo dung.