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**KINETICS AND MECHANISM OF PERSULPHATE POLYMERIZATION OF ACRYLO-
NITRILE IN THE PRESENCE OF CHLORIDE IONS**

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The kinetics and mechanism of polymerization of acrylonitrile were studied using potassium persulphate as an initiator. The parameters varied were the pH of the medium, and initiator and monomer concentrations. The effect of the chloride ions on the reaction rate was also investigated and it was observed that the chloride ions retarded the rate of polymerization. Further, the reaction was found to be sesquimolecular in order.

ACID HYDROLYSIS OF PHENYL ACETAMIDE IN MIXED SOLVENT

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The kinetics of acid hydrolysis of phenyl acetamide has been studied in alcohol - water and dioxane - water in the ratio 50:50 at different temperatures (35 - 60°C). Since the acid hydrolysis is somewhat slow, high concentration of acid i.e. 3N HCl has been used in every experiment. In all cases the reaction was found to follow the first order kinetics. However, a break was noticed in the plot of $\log(a-x)$ vs. time giving two distinct straight lines. Probable mechanism of hydrolysis has been discussed. The energy of activation and the frequency factor were calculated in the two different solvent system.

KINETICS AND MECHANISM OF SULPHOXIDE OXIDATIONS

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Oxidation of diphenyl sulphoxide, *p,p'*-dimethyl-, *p,p'*-dimethoxy-, *p,p'*-dichloro-, and *p,p'*-dinitro-diphenyl sulphoxides with peroxybenzoic acid in toluene, acetone and methanol at 25°, 35° and 45°C ($\pm 0.5^\circ$) has been studied. Activation energies, frequency factors and entropies of activation for these oxidations were calculated. The differences in rate constants have been found to be approximately 55% dependent on differences in energy of activation and 45% on differences in entropy of activation. The rate constants have been observed to be inversely proportional to the dielectric constants of the solvents employed.

ACTION OF CARBON TETRACHLORIDE VAPOUR ON SULPHIDES

Part I.— Sb_2S_3 and CdS

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In the temperature range 200–500°C, carbon tetrachloride vapour reacts with Sb_2S_3 and CdS according as $2\text{Sb}_2\text{S}_3 + 3\text{CCl}_4 = 4\text{SbCl}_3 + 3\text{CS}_2$ and $2\text{CdS} + \text{CCl}_4 = 2\text{CdCl}_2 + \text{CS}_2$. Formation of metal chlorides were quantitative; but that of CS_2 varied between 80.0–92% in the case of Sb_2S_3 and 84.5–97.9% in the case of CdS depending on temperature. The lower yield was found to be due to a side reaction (involving CS_2) that produces sulphur chlorides at lower temperatures upto 400°C. Above this temperature, the side reaction is minimum and only very small amounts of elementary sulphur were formed. No CSCl_2 was traced in the products. Optimum temperature was 450°C for both the reactions.

RESERPINE ANALOGUES: SYNTHESIS OF DIBENZOQUINOLIZINE AND ISOQUINOLINE DERIVATIVES

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2,3,10,11-Tetramethoxy-12-carbomethoxy-5,6,13,13a-tetrahydro-8H-dibenzo (a,g) quinolizine and two 5-carbomethoxy-6,7-dimethoxyisoquinoline derivatives have been prepared for evaluation as reserpine analogues.

A novel approach to the dibenzo (a,g) quinolizine derivative has been made, the C ring being prepared first as the lactam and the latter cyclized.

ISOLATION OF A NEW COMPOUND FROM LAVANDULA STOECHAS LINN

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A new crystalline substance, lavanol, $C_{30}H_{46-48}O_3$, m.p. 280-84°C, $[\alpha]_D^{33} +25^\circ\text{C}$ (THF) has been isolated from *Lavandula stoechas*.

STUDIES ON EUPHORBIA HELIOSCOPIA LINN

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One steroid with molecular formula $C_{29}H_{50}O$, one triterpenoid with molecular formula $C_{32}H_{52}O_2$ and a saturated aliphatic alcohol with molecular formula $C_{21}H_{44}O$ have been isolated from *E. helioscopia*. The plant was also examined for the sugars present.

STUDIES ON CARBOXYMETHYLCELLULOSE

Part IV.—Effect of Pressure Pretreatment

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By effecting the major part of the alkali treatment under pressure, better substitution may be obtained in carboxymethylation of jute cellulose. The time factor for pressure treatment is important and the optimum was found to be 4 hours. Thus, with impure jute, the highest value for degree of substitution obtained was 1.60.

HIGHLY PURIFIED CELLULOSE FROM JUTE FIBRE

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Cellulose was prepared from jute-fibre (*Corchorus olitorius*) purer than any previously reported. A combination of steps was used for pure cellulose preparation, each of which is separately employed in various cellulose industries.

The purest pulp was exceptionally white and had a comparatively high viscosity. The xylose and 4-O-methyl-D-glucuronic acid contents were so low that it may be concluded that these impurities are not chemically combined with cellulose but are probably present as difficultly removable impurities or incrustation. The difficulty in removing the last traces of 4-O-methyl-D-glucuronic acid as well as xylose from the purest pulp supports the hypothesis that these two substances are chemically combined, but not with the cellulose.

DIGESTIBILITY OF THE LEAF PROTEIN CONCENTRATES

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The enzymic digestion of leaf protein concentrates was carried out with trypsin, pepsin, *torula* yeast; and the enzymes present in the aqueous extracts of the berries of *Withania coagulans* and ox pancreas. The digestibility of the samples was determined after 3, 6, 9 and 24 hours.

Leaf proteins showed high rate of digestion with trypsin, pepsin and the enzymes present in the aqueous extract of ox pancreas. The enzymes present in *torula* yeast and the berries of *Withania coagulans* showed poor proteolytic activity.

EFFECT OF FERROCYANIDE ON THE PRODUCTION OF CITRIC ACID FROM CANE MOLASSES BY *ASPERGILLUS NIGER*

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(Received January 31, 1966; revised May 13, 1967)

The citric acid fermentation of cane molasses by *Aspergillus niger* was studied. Addition of ferrocyanide (600 ppm) greatly increased the citric acid yield (60 g/l). The important factors in the production of citric acid are ferrocyanide concentration, morphology of the mould growth and initial pH of the medium. The insoluble complexes of ferrocyanide with heavy metals acted as metal buffers in the fermentation media which made the metal ions available at concentration suitable for maximum citric acid production. The concentration of free ferrocyanide was slightly affected during fermentation. Clarification of the molasses media showed no significant effect on citric acid production.

A STUDY OF THE EFFECTS OF HISTAMINE, FOLIC ACID, ACRIFLAVINE AND INDOLEACETIC ACID ON THE MITOTIC ACTIVITY OF EMBRYONIC CHICK HEART FIBROBLASTS GROWN IN VITRO

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In order to study the effects of chemicals on mitosis, four chemicals, acriflavine, folic acid, histamine and indoleacetic acid were selected. The effects of these chemicals on mitotic activity were determined by observation, by counting the phases and using the formula devised by Wilson and Leduc.

$$\text{Mitotic activity} = \frac{\text{number of mitotically active cells}}{\text{area of section} \times \text{nuclear density of section}}$$

The results indicated that the highest mitotic activity was in the explants which contained 50 μ g/ml of indoleacetic acid. All concentrations of acriflavine were strong mitotic inhibitors. Folic acid and histamine were mitotic stimulants at 50 μ g/ml concentration. But 10 μ g/ml and 100 μ g/ml concentration had no effect at all.

The use of indoleacetic acid, a plant growth hormone, augmented the growth of chick heart fibroblasts. The similarity of effects of indoleacetic acid on plant and animal cells, may be due to the similar mechanism of nuclear division.

STUDIES ON FUNGITOXICITY OF A COPPER BASED COMPOUND S-3

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Fungitoxicity studies of a new copper-based compound, S-3, were carried out in comparison with another imported copper compound against some plant pathogenic fungi. It was found that the compound S-3 was more effective in controlling the growth of *Helminthosporium anomalum* than Colloidal copper but was equally effective against *Fusarium solani*.

The effectiveness of S-3 against *Fusarium dimerum* and *Alternaria tenuis* was found to be less as compared to Colloidal copper. This may be due to more resistant nature of these two fungi towards compound S-3.

The present studies, show that S-3 may be recommended for further exploitation as a commercial fungicide.

FUNGAL INFECTIONS AND INFESTATIONS OF VEGETABLES FROM KARACHI MARKET

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A survey, to study the various fungi present on vegetables sold in Karachi markets, was conducted. Potato, tomato, spinach, garlic, onion, peas, chillies, ginger and methi etc., collected from six different and far apart vegetable markets, were found to be infected or infested with *Aspergillus niger*, *Alternaria* sp. *Fusarium solani*, *Cercospora beticola* and *Rhizopus nigricans* etc. Most prevalent among the fungi isolated were *Aspergillus niger* and *Alternaria* sp.

**QUANTITATIVE DETERMINATION OF ACID AND ALKALINE PHOSPHATASE IN
DIFFERENT PARTS OF THE ALIMENTARY CANAL OF DESERT LOCUST,
SCHISTOCERCA GREGARIA (FORSKAL)***

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Biochemical estimation of phosphomonoesterases was done in different parts of the alimentary canal. Quantitative determination of phosphatases showed strong acid phosphatase activity in Malpighian tubules, posterior-midgut, fore-hindgut, caecum and anterior-midgut in decreasing order. Moderate activity was noticed in hind-hindgut, mid-hindgut, salivary glands and hind-foregut. Low activity was found in fore-foregut and mid-foregut.

Strong alkaline phosphatase activity was found in caecum, anterior-midgut and salivary glands. Moderate activity was found in hind-foregut and fore-foregut, while low in posterior midgut, mid-foregut, fore-hindgut, hind-hindgut, mid-hindgut and Malpighian tubules.

A MELTING POINT METHOD FOR WAXES

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A new technique based on the variation of physical state under the influence of surface tension near the transition point has been evolved for the determination of melting point of waxes. An apparatus employed in this technique has been devised and successfully operated. Using this technique two methods have been developed, one of moderate accuracy of the order ± 1.5 C and the other of considerably improved accuracy. The latter method employs graphical extrapolation. Results of the melting point determination for three waxes are given and compared with those obtained by a conventional method.

STUDIES ON RESINS FROM MAKERWAL COAL

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Makerwal coal is known to contain a high percentage of resins which are recoverable by solvent extraction. Alternative methods of recovery reported earlier^{3,5} show a wide degree of variation in the yield of resins and the quality of coal residue. An attempt has been made to evaluate these methods, by studying separately the behaviour of original coal, solvent extracted resins and the coal residue from solvent extraction, on superheated steam treatment and carbonisation. It was found that on superheated steam treatment at 300-330°C these resins were only partially recoverable while on carbonisation extensive cracking of the resins was observed. The experimental data from the present work and critical review of the earlier work in this direction has clarified some of the hitherto reported anomalies of the behaviour of Makerwal coal.

RELATIONSHIPS OF MEDULLATION TO FINENESS AND TOUGHNESS OF WOOL FIBRES FROM A FLEECE OF BIBRIK WOOL

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A sample of Bibrik fleece was sorted into three fibre types; true, heterotype and kemp. The sorting resulted in a ratio 1.9 of secondary to primary fibres in the fleece. Percentage medullation (P) in each heterotypical fibre was estimated by a new method employing a specially graduated lanameter. Relationships of P to root mean square radius $\sqrt{\overline{r_f^2}}$ and toughness (T) in each fibre were obtained from data on 60 fibres. A significant positive correlation between P and $\sqrt{\overline{r_f^2}}$ and a significant negative correlation between P and T_o were revealed in the case of heterotypical fibres. In the 40 kempy fibres studied, the coefficient of correlation between P and $\sqrt{\overline{r_f^2}}$ was not significant but that between P and T was highly significant. As expected, the kemp fibres had much more P and lower T_o than the heterotypical fibres. Comparison of the average values of P in sample of the heterotypical fibres indicated that median rather than mean is more representative of class average owing to skewness of the distributions of parameters such as the radii of fibres and medulla.

SHORT COMMUNICATION

223

A MODIFIED SYNTHESIS OF FURAN-3, 4-DICARBOXYLIC ACID

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CHEMICAL COMPOSITION OF ADHATODA VASICA LINN—II

224

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**TERMITE REARING AND TESTING OF MAKROLIN AS A WOOD-PRESERVATIVE
AGAINST TERMITES. (ISOPTERA-TERMITIDAE)**

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THE HEALTHY JUICE EFFECT IN VIRUS TRANSMISSION*

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SYNTHESIS OF 3-METHYL-4-BENZYLIDENE ISOXAZOLONE AND 4,4-BENZAL-BIS-(3-METHYL-ISOXAZOLONE-5)

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