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INVESTIGATION OF THE CHARACTER OF SOME OF THE JUMPS IN ACTIVATION ENERGY OF VISCOUS FLOW IN PURE LIQUIDS AND SOLUTIONS

Part I.—Some Measurements at Small Thermal Intervals on (a) Dilute Aqueous Alcohol (11%) and (b) Pure Water

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The occurrence of sharp jumps (of magnitude of the order of 5%) in the activation energy of viscous flow E_η, for several pure liquids and solutions is now well-established. A preliminary attempt has also been made to apply order⇌disorder phenomena to estimate specific heat anomalies expected to be associated with any second-order transitions at these jumps. Examination of temperature variations of (1) coefficient of dilatation and (2) index of refraction have supported the existence of some type of changes occurring at the temperatures of these jumps, and the present communication gives a further study of the nature of these jumps by remeasuring typical steps in 11% dilute aqueous ethyl alcohol and in water at the much closer intervals of 0.5° C. and 0.2° C., with improved experimental technique.

For 11% aqueous alcohol, the measurements give temperature ranges of 0.19°±0.03°C. for the jumps, which is almost equal to the smallest temperature interval (0.2°C.) used. Similar measurements for water give an average of 0.16°C. for the widths of the jumps. The conclusion is drawn that these widths are entirely due to the experimental interval and because $\delta T/Tc$ is less than 1/1000 in this case, therefore, for practical purposes, these jumps may be considered as *discontinuous* changes in activation energy E_η.

COMPARATIVE MEASUREMENTS OF THE TEMPERATURE DERIVATIVES OF VISCOSITY, DENSITY AND REFRACTIVE INDEX OF PURE LIQUIDS AND SOLUTIONS

Part II.—Dilatometric, Refractive Index and Flow Activation Energy Measurements on Benzene at Intervals of 1°C. to 2°C. in the Range of 10°C. to 50°C.

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In part I of this paper, some measurements on the coefficient of dilatation β of ethylene glycol in the range of 20°C. to 80°C. showed a roughly sinusoidal variation with peak-to-peak amplitude seven times the experimental error, and period 5° to 10°C. The majority of minima coincided within ± 1°C. with sharp jumps already observed in E/R, and a similar correlation between activation energy of viscous flow E/R, refractive index and coefficient of dilatation was earlier observed in the case of water. To elucidate these phenomena, measurements on benzene, a non-hydroxylic liquid are now reported.

The values of $\beta \times 10^4$ ow fairly regular cyclic behaviour, and maxima are observed at 15°C., 20°C., 23.5°C., 27°C., 31.5°C., 37°C., 40°C., 44°C., and 49°C., which coincide exactly in position with the previously found maxima in E/R. The peak-to-peak variation is 0.8 to 1 unit, which is about 15 times the standard deviation. A comparison is made with previous data on density reported by various workers, which shows evidence of 5 or 6 maxima. Measurements are also made for the temperature derivative of refractive index with Na'D' and Cd green lines, and show reasonably cyclic variation.

It is found that the peaks based on refractive index occur at slightly higher temperatures than those for E/R and β, the average temperature excess being 1.2°C., which is one quarter of a complete cycle (4°C.,). This indicates that $\frac{dn}{dT}$ is parallel either to the first derivative or to the integral of E/R and β. Further work on aqueous alcohol solutions is in hand.

STUDIES IN THE ALKALOIDS OF RAUWOLFIA CAFFRA SONDER

Part I.—Isolation of Ajmalicine, Ajmaline, Raucaffrine* and Three New Alkaloids, Raucaffricine, Raucaffriline and Raucaffridine

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STUDIES ON "SILAJIT" (ASPHALT)

Part I.—Composition of the Mineral and Proteinous Matter

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"Silajit" (asphalt) has been studied with respect to its proteinous and mineral matter. The quality as well as quantity of its amino acids is indicative of its animal origin.

PREPARATION OF LINSEED FATTY ACIDS-BETULINOL ESTERS AND THEIR EVALUATION AS PROTECTIVE COATING VEHICLES

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This paper deals with a new series of esters prepared by condensation of linseed fatty acids with betulinol and extracts of *Betula utilis* (Bhojputr) at 270-80°C. These compounds have longer induction period but ultimately become tack-free in a shorter period as compared with linseed oil. Esters prepared by partial reduction in acid value by extracts of *Betula utilis* and subsequent reacton with glycerol or pentaerythritol are the best in this series. The bodying characteristics and varnish-making qualities of these esters have also been studied. On the whole these esters are better than linseed oil for use in coating compositions.

A MOULDING COMPOSITION FROM VEGETABLE-TANNED LEATHER SCRAP

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Tanned leather scrap was hydrolysed with sulphuric acid into a plastic mass which was dried and powdered. The powder was treated with formalin, blended with saw dust and other ingredients and then hot pressed or mixed with saw dust only, cold pressed, and later on, treated with formalin. The compositions obtained exhibit the requisites of urea-formaldehyde and phenol-formaldehyde resinous compositions.

PREPARATION AND BIOCHEMICAL ASSAY OF PHARMACEUTICAL ENZYMES FROM PANCREAS (A SLAUGHTER HOUSE WASTE)

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Four different methods were tried for the extraction of Pancreatin from the pancreas of ox and buffallo (a slaughter house waste). Activity units of the enzyme constituents i.e. amylase, lipase and trypsin were determined in the various pancreatin powder preparations.

It was observed that the acetone precipitation method was most suitable. The product thus obtained exhibited maximum enzymatic activity and the method also proved fairly economical.

BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN RICE AND RICE PRODUCTS

Part III.—Differential Titratable Acidity and Auto-esterase Activity of Raw and Parboiled Rice and Effect on their Storage

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The effect of parboiling treatment on the titratable acidity and on the activity of esterase group enzymes was investigated on sixteen varieties of rice. The results show that in the resting stage the parboiled rice contains comparatively higher titratable acidity than raw rice but the incubation of these samples for 5 hours at 37°C. causes greater percent increase in the case of raw rice than in parboiled one. On storage the increase of acidity was less in parboiled samples than in the raw ones. Incubation of the stored samples caused similar higher percentage increase in the acidity of raw rice than of the parboiled ones. The significance of the results has been discussed in the light of the apparent relationship between the lower esterase activity of parboiled rice and paddy and their longer storage life.

PECTIC ENZYME OF PENICILLIUM FREQUENTANS INVOLVED IN THE RETTING OF JUTE

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Penicillium frequentans secreted a pectic enzyme in the culture media with or without pectin. Of the different substrates, pectin, sodium-pectate, de-esterified pectin, starch and albumin tested, the enzyme was active only on the substrates, pectin, sodium-pectate and de-esterified pectin. The activity was optimum at pH 3.2 and 5.0 and at a temperature of 23°C. but it decreased with dilution and was not inhibited on dialysis. The enzyme macerated both potato discs and jute barks and retted jute stems. It has been identified as a mixture of pectin-polygalacturonase (PG) and pectin-methylesterase (PME). The mechanism of jute retting in terms of hydrolysis by the above enzyme has been discussed.

THE STUDY OF THE ALIMENTARY TRACT OF SCHISTOCERCA GREGARIA (FORSKAL) (ORTHOPTERA : ACRIDIDAE)

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The average length of gut in normal position was 44.8 and 51.8 mm. in male and female Desert locust, respectively.

Histologically the alimentary tract was surrounded by peritoneum, muscular layers and epithelium through out its length. The development of muscular and chitinous layers was found to be maximum in the fore-gut. Longitudinal muscles in mid-gut were outside the circular muscles. The mid-gut and the hepatic caecae were the only part of the gut having columnar ciliated cells. The peritrophic membrane was non-cuticular ring.

Histologically hind-gut resembled the fore-gut except that the six longitudinal muscles were external to the circular muscles.

COMPARATIVE STUDY OF THE ZOEAE OF THE SAND CRABS, PHILYRA CORALLICOLA (ALCOCK), PHILYRA GLOBOSA (FABRICIUS) AND DESCRIPTION OF FIRST ZOEA OF LEUCOSIA PUBESCENS (MIERS) (DECAPODA: CRUSTACEA)

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The paper deals with the comparative study of first zoeal stages of three crabs of subtribe Oxystomata found in Karachi. Zoeae of *Philyra corallicola* and *Leucosia pubescens* were obtained by rearing the crabs in the laboratory. Description of zoea of *P. globosa* was taken from Chhapgar for comparison. Measurements of zoeae were taken which indicate that zoeae of *P. globosa* is larger than zoeae of *P. corallicola*. Significant structural differences are also recorded.

SHORT COMMUNICATION

EFFECT OF GIBBERELLIC ACID GROWTH AND ALKLOIDS IN HYOSCYAMUS MUTICUS LINN

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NON-SPECIFIC INHIBITION OF THE RAT UTERUS BY HEPARIN

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STUDIES ON SHARK LIVER OIL

Part III.—Use of alcohol for the Preparation Vitamin "A" Concentrate from the Oils of High Acidity

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(Received May 22, 1964)

EXTRACTION OF URANYL SALTS BY THE NOYLTRIFLUOROACETONE IN CARBON TETRACHLORIDE

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