

**DETERMINATION OF NITROGEN IN ORGANIC COMPOUNDS WITHOUT
DISTILLATION**

Part I.—Determination of Ammoniacal Nitrogen in Organic Compounds

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The distillation step in the macro-determination of ammoniacal nitrogen in organic compounds by Kjeldahl method is eliminated. After having digested the sample in sulphuric acid with potassium sulphate and mercuric sulphate, the acid is neutralised. The resulting ammonium sulphate is treated with an excess of hypochlorite in presence of potassium bromide. An excess of arsenite is then added and back-titrated with hypochlorite using bordeaux indicator.

A PRELIMINARY NOTE ON XANTHOXYLUM BUDRANGA FRUITS

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Xanthoxylum Budranga or bazna fruit has been examined. It yields an essential oil baznin from the calyx and a fixed oil from the fruit. The fixed oil has a consistency that is suitable as a raw material for soap, and consists of partly oleic acid and partly palmitic and stearic acids. Some amount of carbohydrate and protein are also available from the kernel powder.

STUDIES ON TROMBIDIUM TINCTORUM LINN.

Part .I—Chemical Constitution of the Fat of Trombidium Tinctorum Linn.

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Various physico-chemical characteristics of the fat of *Trombidium tinctorum* Linn. have been studied. Relative proportions of solid, liquid and steam-volatile acids have been determined. The water-soluble and the water-insoluble steam-volatile acids were studied as such. The various solid and liquid fatty acids, separated by Twitchell's lead salt alcohol method, were determined after fractionation of their methyl esters under reduced pressure.

BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN FISH**Part II.—Assessment of Dehydrogenase Activity in Fish Tissue and Investigation on the Mechanism of Fish Spoilage by this New Method**

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A new method for the study of spoilage of fish has been developed. The dehydrogenase activity of the tissue has been investigated by noting the time of discharge of methylene blue according to Thunberg technique after allowing the tissue enzyme to act on the tissue substrates. On the basis of this new technique, 1 g. flesh of Koi, Singi, Bele and Hilsa showed slight activity whereas younger samples of Rohu, Katla, Kali Baus, Mrigale and Air and smaller species, Chapila and Puti showed almost negligible activity of dehydrogenase at the initial stage just after purchase from the market. On storage for 24 hours, a high rate of dehydrogenase activity was noted in each of the above fish samples—comparatively Singi, Koi, and Boyal showed less generation of activity than the others. The significance of these data and their relationship with the titratable acidity values as were presented in Part I of this paper have been discussed.

STUDIES ON CITRULLUS COLOCYNTHIS SCHRAD.

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Two crystalline sterols have been isolated from the roots of *Citrullus colocynthis* Schrad., which differ from those isolated so far, and have been tentatively named *citrullus colocynthis* sterols A and B. Isolation of the alkaloid *colocynthis* in a crystalline form could not be achieved.

MEAN FREE PATH OF 4.5 BEV π -MESONS IN ILFORD G5 EMULSIONS*

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The experimental value of the mean free path for the nuclear interaction of artificially produced π -mesons of 4.5 Bev. energy has been found to be 33.5 ± 3.5 cm. Ilford G-5 emulsions, 400 microns thick, were exposed to the high energy meson beam, the measurements being made by the so-called "Line Scanning" or "the following along the track" method. Our result is comparable with earlier data for mesons with energies upto 3 Bev.

THE INFLUENCE OF LONG-CHAIN PHENOLIC ADDITIVES ON THE VISCOSITY OF MINERAL OILS

Part V.—Phenomena occurring in the Proximity of the Miscibility Limit in Mixtures of Allyl Catechol and Mineral Oil

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Earlier experiments on the viscosity depression occurring in solutions of allyl catechol in mineral oil have been extended, and the results are analyzed to investigate the nature of the large anomalous *increase* in viscosity noticed in the range of 30% to 80% allyl catechol. This increase above the normally depressed value has been estimated as a Reduced Viscosity i.e. $(\Delta\eta/\eta) \div$ concentration, and plotted as a function of the temperature excess, ΔT , above the miscibility temperature for four different concentrations of allyl catechol varying from 20% to 70%. From this data, the graph for Intrinsic Viscosity (i.e. the limit of reduced viscosity at zero concentration) as a function of ΔT is obtained, which lends itself to an interpretation of the phenomenon as an incipient separation into macro-molecules of **the two components**. **The Intrinsic Viscosity for $\Delta T \rightarrow 0$ is about 0.3, and, by using Staudinger's equation for the degree of polymerization in colloids, it is possible to estimate the number of molecules in each macro-molecule as about 70 when just above the miscibility temperature.**

On the basis of these experimental data, an attempt is made to explain the different values of the coefficient of the quantity, $\ln \eta$, in the empirical equation, $\ln(-\Delta\eta) = K + A \ln \eta$, in the case of ⁰⁶ variation of number of OH groups in a single series of phenolic compounds, and (ii) variations of temperature for a binary system.

**INFRARED ABSORPTION STUDY OF THE RELATION BETWEEN VISCOSITY AND
INTERMOLECULAR HYDROGEN-BOND FORMATION FOR SOLUTIONS OF
PHENOLIC COMPOUNDS IN OILS**

Part II.—Solutions of Allylphenol in Mineral Oil

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The theoretical formula connecting H-bond absorbance with the relative viscosity depression, viz.

$$-\frac{\Delta \nu}{\nu} = K \frac{C}{100} \left(1 - \frac{a_c/C}{a_{100}/100} \right)$$

developed in part I of this paper is now further verified with solutions of allyl phenol in mineral oil. The value of the non-dimensional constant 'K' is found to be 0.83 ± 0.06 , which compares well with the value 0.77 ± 0.04 obtained for bhilawanol, $C_6H_3(OH)_2C_{15}H_{27}$. This suggests that K is a generally applicable constant with a value of 0.80 ± 0.03 .

**CHEMICAL AND X-RAY EXAMINATION OF AN ASBESTOS-LIKE MINERAL
OCCURRING IN HINDUBAGH**

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(Received October 1, 1959)

A fibrous asbestos-like mineral from Hindubagh has been examined chemically and with the help of X-ray diffraction patterns. It has been found to consist of 50% brucite ($\text{Mg}(\text{OH})_2$), 40% dolomite ($\text{MgCO}_3\text{CaCO}_3$) and at most 10% chrysotile asbestos. The chrysotile component has been identified by means of fibre and powder X-ray patterns of the residue obtained from acid-treatment of the original sample.

STRUCTURAL STUDIES ON THE MAGNETIC FRACTION OF STEAM-TREATED MAKERWAL COAL

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In the preliminary study, both sulphur and oxygen were found to be significant elements of the magnetic fraction obtained from Makerwal coal, steam-treated at a temperature of 350°C., and the available data showed them to be present as (Fe₃O₄ + S). The present investigation attempts to elucidate precisely the nature and quantities of the phases containing this sulphur. Measurements with a Guoy magnetic balance at a series of different field strengths show a rapid increase in both para and ferro-magnetic properties of the treated coal when the treatment is carried out at 300°C., or above. A comparison of these measurements with chemical estimations of total iron, total sulphur and pyritic sulphur indicates that at 400°C. only a fifth of the iron is converted into the ferromagnetic Fe₃O₄, and provides evidence for the existence of the highly paramagnetic Fe_nS_{n+1}, which is apparently produced as an intermediate product in the conversion of FeS₂ into Fe₃O₄. Successive magnetic separations carried out in the dry state gave three strongly magnetic fractions, but failed to provide any appreciable separation between the para and ferro-magnetic components.

An X-ray powder diffraction analysis of these magnetic fractions and of the untreated and treated coal as such shows that, whereas the untreated coal contains kaolinite and FeS₂ as the major crystalline phases (amounting to 5% and 2% respectively), the first magnetic fraction contains four major iron-bearing phases, viz., Fe_nS_{n+1}, FeS₂, FeS and Fe₃O₄, in the approximate percentages, 5, 5, 2 and 4, respectively. These figures lead to an estimate of 9% iron and 6% sulphur, in fair agreement with the chemically determined values of 8.8% and 7.2%. The ratios of these four constituents are essentially the same in the treated coal and the three successive magnetic fractions.

The anomalous preponderance of Fe₃O₄ and the near absence of iron sulphides noted in the earlier communication are corroborated by a better X-ray pattern of the old concentrated sample, and are probably due to preferential concentration of the Fe₃O₄ in the wet magnetic concentration process that was used in the previous work.

**A PRELIMINARY NOTE ON THE SEED CONSTITUENTS OF CAESALPINIA
BONDUCELLA**

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The powdered kernel of bonducella nuts has been extracted successively with light petroleum (b.p. 40-60°C.), chloroform, rectified spirit and water at room temperature. The petroleum extract gives a fatty oil in ca. 20% yield, having an iodine value of 112; the oil deposits a jelly-like substance on long standing. From the chloroform extract, two new highly crystalline bitter substances α -caesalpin, m.p. 187° and β -caesalpin, m.p. 239-240° have been separated, while the alcoholic extracts yield sucrose in two crystalline forms, one cube and the other rectangular bar, besides some reducing sugars. A water soluble protein has also been obtained from the aqueous extract.

STUDIES ON THE THERMAL DECOMPOSITION OF ALKALINE EARTH SULPHATES

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Decomposition of alkaline earth sulphates as such and in the presence of various substances has been studied. It was observed as follows: calcium sulphate decomposed 0.53% at 900°C. and 3.15% at 1050°C. maintained for 4 hours; barium sulphate 3.93% at 1050°C. maintained for 4 hours; strontium sulphate 0.82% at 900°C. and 5.164% at 1050°C. maintained for 4 hours; and $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 43.0% at 900°C. for 6 hours.

The maximum decomposition of alkaline earth sulphates in the presence of alumina in the ratio of 1:1 by weight at a temperature of 900°C. maintained for 6 hours was noted to be $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, 88% and $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$, 9.72%, the water of crystallisation being subtracted in each case. These results differ a good deal from those presented by some of the previous workers.

Decomposition of alkaline earth sulphates in the presence of chromium oxide, chromite ore, kaolin, bentonites, calcined graphite (free of carbon) and various other oxides were tried, and it was observed that some form of silica accelerated the rate of decomposition. Diatomaceous earth, a form of amorphous silica, was also tried, and the results confirmed the above findings. As diatomaceous earth is not available in our country, 'flue dust', a source of active silica and an easily available raw-material, was substituted successfully. This process therefore can usefully be employed for the production of sulphur dioxide and the residue used in cement industry on commercial scale.

DIFFERENTIAL SURVIVAL OF TWO RACES OF PHYTOPHTHORA INFESTANS*

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The effect of forced air-drying for varying periods has been studied on race A and race BD of blight of potato fungus, *Phytophthora infestans* (Mont) de Bary. The very much greater resistance of race A is connected with its dominance.

A STUDY OF SOME INDIGENOUS PHARMACOPOEIAL HERBS

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The description, occurrence, analytical data and important therapeutic properties of the following indigenous pharmacopoeial herbs have been given : *Podophyllum, Belladonna, Datura* and *Hyoscyamus*.

SCOPE FOR DEVELOPMENT OF FERMENTATION INDUSTRIES IN PAKISTAN

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A general survey of the field is given with emphasis on the applications of microbiological fermentation processes to the production of industrial chemicals, pharmaceuticals, foods, etc., in Pakistan.

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A NOTE ON PAKISTANI ARTEMISIA

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**A SURVEY OF FRUITS IN THE NORTH-WESTERN REGIONS OF
WEST PAKISTAN**

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**A NEW SPECIES OF ALTERNARIA ON CASSIA HOLOSERICEA
FRESEN**

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A NOTE ON THE OIL CONTENT OF SOME KARACHI SARDINES

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