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TEMPERATURE DERIVATIVES OF VISCOSITY, DENSITY AND REFRACTIVE INDEX FOR THE WATER—ETHANOL SYSTEM

Part I.—Refractometric and Flow Activation Energy Charts for Dilute Aqueous Alcohol from 2% to 11% Alcohol and some Concentrated Ethanol Solutions

TAYEB M. QURESHI AND (MRS.) Z. HAIDER

Physics Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

AND

M.M. QURASHI

Defence Science Organization, Ministry of Defence, Government of Pakistan, Karachi

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A systematic study of the temperature derivatives of various physical properties of the water-ethanol system is being undertaken. The three important quantities, namely viscosity, refractive index and density are first taken up, and this communication presents data on the first derivative of refractive index (dn/dT) and viscosity ($E_\eta = T^2\, d \ln \eta/dT$) for solutions at the two ends of the system, (i) those containing 2 percent to 11 percent ethanol by weight, as well as (ii) those containing 92 percent to 95 percent ethanol by weight.

It is found that the minima of (-dn/dT) nearly coincide with the jumps in activation energy E_η for viscous flow of the dilute ethanol solutions, and a tentative chart is prepared containing a series of graphs, each showing the variation of temperature for a particular jump (and minimum of -dn/dT) as the ethanol concentration varies from 2 percent to 11 percent by weight. A similar chart is shown for the maxima in (-dn/dT), and some anomalies are noted.

Similar refractometric measurements are given for 92 percent to 95 percent ethanol, where certain abrupt changes had previously been observed in the cyclic variations of activation energy. The growth of an 'anomalous' maximum and minimum is followed very readily on the dn/dT curves. Further measurements on dilute and concentrated ethanol are in progress.

X-RAY STUDIES OF THE IRON ORES FROM CHICHALI AREA OF THE KALABAGH ORE-FIELDS

The Analysis of the Component Mineral Phases

DABIR AHMAD, M. SUALEHIN AND S.S.H. RIZVI

Physics Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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A detailed X-ray analysis of the Chichali ore has been undertaken in order to determine its different constituent mineral phases. This study shows that the ore contains siderite, limonite and glauconite as its major constituent components. In some samples chamosite has also been detected. Thus this ore seems to be somewhat different from those of the Kutch-Khartop and Ziarat ores in composition, but perhaps the presence of glauconite in this ore may present much the same kind of problems for the successful recovery of iron as have been experienced with the other ores.

ANGLE OF REPOSE AS FUNCTION OF THE PHYSICAL PROPERTIES AND THE PARTICLE-SIZE OF THE MATERIALS

SHABBIR AHMAD QURESHI AND NAYEEMUDIN

Engineering Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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A correlation tan $\theta_{s,d} = K \varepsilon \mid dp\ (1-\varepsilon)3 \rceil 0.11$ where tan θ is the tangent of the angle of repose θ (static or dynamic), K is a constant, dp is the mean sieve particle-size and ε is the voidage fraction, is presented. Compared with other correlations, its application is simple and the results are accurate within a maximum error of $\pm 3\ \%$. It has also been shown that the tangent of the dynamic-angle is 1.126 times the static-angle over a specific gravity range of 1.3903—.300.

MOLECULAR COMPLEXES OF PICRIC ACID WITH AROMATIC HYDROCARBONS AND THEIR DERIVATIVES

Part I.—Association Constants of 1:1 Substituted Naphthalene-Picric Acid Complexes

I.H. RESHAMWALA

337, Bahadurabad, Road No. 14, Karachi-5

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Interaction between aromatic nitro and polynitro compounds such as symmetrical trinitro—benzene, picric acid, picryl chloride etc., and aromatic hydrocarbons and their derivatives has been a subject of study by various physical methods. In the present investigation association constants of 1:1 complexes of Naphthalene, 1—and 2—methyl naphthalenes, 1—and 2—methoxy naphthalenes, 2—naphthol, 1—chloro and 1—and 2—bromo naphthalenes with picric acid have been determined in chloroform medium by partition method. These values have been utilised to compare the donor capacities of the compounds studied and the effect of the substituent groups on the stability of complexes. Also an attempt is made to throw light on the nature of interaction between the two components of the complex by studying the temperature dependence of their complexation.

FALL TIMES OF METEORITIC DUST IN THE UPPER ATMOSPHERE

M. MUNIR QURESHI
Dawood College of Engineering and Technology, Karachi
AND
J. MAYBANK
Physics Division, Saskatchewan Research Council, Saskatoon, Canada

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Based on Stokes' law, calculations have been made to determine terminal velocities and fall times from various heights for meteor dust particles of different diameters. While, mean values of 1.8×10^{-4} g./cm. sec. for air viscosity and 5 g./cm3. for the density of meteoritic material have been used in the calculations, Cunningham's correction has been applied to Stokes' law to account for the molecular mean free path variation with height and its influence on fall times. It has been found that micrometeorites take varying times to reach the tropopause from different heights.

THE 5-AND 8-IODINATION OF QUINOLINE AND SOME OF ITS DERIVATIVES

M. KIAMUDDIN AND M.E. HAQUE

North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

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Quinoline (0.3 mole) and silver sulphate (0.2 mole) in 98 percent sulphuric acid at 150–200°C., and iodine (0.2 mole) give 5-iodoquinoline (20 percent), 8-iodoquinoline (18 percent) and 5:8-diiodoquinoline (35 percent), the approximate proportions were determined from the products isolated. With an excess of quinoline, monoiodoquinolines predominate and with silver sulphate and iodine in excess, 5:8-diiodoquinoline is the major product. 5-iodo and 8-diiodoquinolines are similarly iodinated to form 5:8-diiodoquinoline. It is considered that the positively-charged iodinium ion (I+) and the protonated form of the bases are the principal species involved in the initial and the subsequent iodination. Such reactions should form convenient preparative routes to mono and diiodination of quinoline.

CHEMICAL CONSTITUENTS OF CORYDALIS STEWARTII FEDDE

M. Ikram, M. Ehsanul Huq and S. A. Warsi

North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

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Three alkaloids provisionally named and formulated as (a) Corycidine, $C_{11}H_{11}O_4N$, m.p. 290-92° (dec.), (b) Corydinine, $C_{17}H_{17}O_4N$, m.p. 199-200° and (c) Corydicine, $C_{19}H_{17}O_5N$, m.p. 181-82° have been isolated from *Corydalis stewartii* Fedde. Besides, a saturated alcohol $C_{30}H_{62}O$, m.p. 76-77° has also been obtained from the fatty portion.

CHEMICAL CONSTITUENTS OF EUPHORBIA ROYLEANA BOISS*

Part II

MUHAMMAD NAZIR, IFTIKHAR AHMAD, M. K. BHATTY AND KARIMULLAH

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

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3,3'-Dimethoxy ellagic acid, succinic acid, and an unidentified compound $C_{19}H_{16}O_7$ containing a number of ester groups have been isolated from *Euphorbia royleana* Boiss.

TRITERPENOIDS I. THE SAPOGENINS OF FAGONIA CRETICA LINN. (ZYGOPHYLLACEAE)

M. Amjad Ali and (Miss) Zahida Hameed

Drugs and Pharmaceutical Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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The water soluble saponins, which are present in *Fagonia cretica* in high concentration, have been extracted and hydrolysed into a mixture of sapogenins and sugars. Among the five sugars found in the hydrolysate, four have been identified as glucose, rhamnose, xylose and arabinose. From the mixture of sapogenins, two pure, well-crystalline sapogenins, provisionally named as Fagogenin and Genin-A, have been isolated. The molecular formulae of Fagogenin and Genin-A have been found to be $C_{30}H_{48}O_4$ and $C_{29}H_{46}O_5$ respectively and the former has been characterised by preparation of its diacetate and dibenzoate. Spectroscopic studies on both the compounds have been made and the oxygen functions of Fagogenin have been determined. Fagogenin has been found to contain a lactone and two hydroxyl groups in addition to, at least, one double bond.

DETERMINATION OF NITROGEN IN ORGANIC COMPOUNDS

R. A. Shah and (Miss) Nasim Akhtar Bhatti

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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The determination of nitrogen in nitro, nitroso and azo compounds is described. The compounds are digested with sucrose and sulphuric acid in a sealed tube. The digest is passed through two columns of anion-exchange resin, placed one above the other. The upper column contains the resin in the hydroxide form and the lower in the iodide form.

COMPLEXOMETRIC ESTIMATION OF MICROGRAM AMOUNTS OF COPPER USING E.D.T.A.

S.M. Ali and Izhar-ul-Haque

Mineral Research Division, North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

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Microgram amounts of copper can be determined by titration against a standard EDTA solution using pyridine and potassium thiocyanate as an indicator at pH 5.2. Bromobenzene is used to enhance the sharpness of the end point. At the end point the colour change is from green to colourless which can be readily detected visually. As little as 25μg of copper in 25 ml. solution can be estimated. Citrate, pyrophosphate, thiosulphate and oxalate interfere. In the presence of interfering cations modified procedures such as masking, solvent extraction and Lead Collector separation procedure give accurate results.

ACTIVATION EFFECTS OF MAGNETISM ON REDUCED NICKEL SUPPORTED ON METALLIC OXIDES*

S.M. Ismail

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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A study was made of the magnetic susceptibility of the various metallic oxides used with varying quantities of nickel supported on them. It was shown that there is an increasing amount of evidence in favour of a direct relationship between the magnetic susceptibilities of the supports and their catalytic activities. An attempt was made to study the nature of the reduced nickel on the supports by the carbon monoxide chemisorption method, electron microscope and X-ray diffraction.

BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN FRUITS

Part II.—Differential Mechanism of Ripening of Ordinary Variety and *Kanchamitha* (Unripe Green Sweet) Variety of Mangoes (*Mangifera indica*)

H.N. De and J.C. Debnath

Nutrition Section, Food Research Division, East Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Dacca

(Received November 24, 1964)

The differential mechanism of ripening of local ordinary varieties of mangoes has been investigated by measurement of the changes in titratable acidity, reducing and non-reducing sugars and the dehydrogense activities at different stages of their growth upto ripening and comparison against the values of the same for *Kanchamitha* variety which is sweet even in the green stage. The results show gradual increase of acidity in every part of the ordinary mango with the progress of growth upto maturity and then a decline of the above value when the mango ripens. This fall in acidity is associated with the formation of both reducing and non-reducing sugars and the elaboration of dehydrogenase activities. In the case of *Kanchamitha* variety, even in its unripe condition the acidity is low in association with more contents of sugars and more activity of the dehydrogenases. The significance of these results in the above varieties of mangoes has been discussed in the light of the two different mechanisms operating in the process of ripening of mangoes.

ELECTROLYTIC PREPARATION OF COPPER CARBONATE

M. Aslam Sahi, Naseeruddin Sheikh and Asaf Ali Qureshi

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

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Electrolytic preparation of basic copper carbonates has been studied. The electrolysis was carried out both with a mixture of sodium sulphate and sodium carbonate or sodium sulphate alone with the incorporation of CO_2, using copper electrodes or lead as cathode. The maximum current efficiency (98 percent) was obtained with the concentration of 60 g. per litre Na_2SO_4, and at a current density of 13.5 amp./ft^2. 'Thur' (salinity) being abundantly available Containing sodium sulphate 25-30 percent, Na_2CO_3, 12-15 percent and NaCl, 5-7 percent provided the electrolytes. Cupric sulphate was prepared by dissolving the basic carbonate obtained from the above process in dilute sulphuric acid and crystallized out.

TURPENTINE OIL-BASED CHEMICALS

Part I.—A new Method for the Production of Terpin Hydrate [1]

MIRZA NASIR AHMED, ABDUL SATTAR, MUNIR AHMED, IFTIKHAR AHMAD, M.K. BHATTY AND KARIMULLAH

West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

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A systematic study of the production conditions for terpin hydrate has been carried out. The application of either benzene- or toluene sulphonic acid has advantageously eliminated the use of sulphuric acid in the existing processes. In contrast to sulphuric acid, the sulphonic acids do not require the presence of additional emulsifiers and the maintenance of costly conditions of low temperature and inert atmosphere. The yield of the hydrate with either acid is also always higher than that obtained with sulphuric acid.

EVALUATION OF ANTIFIREOL—A FOAM FIRE FIGHTING COMPOSITION

M. Arshad A. Beg, M. Jehangir and Moinuddin Khan

Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi

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Antifireol has been tested for its stability, compression ratio, density, drainage of liquid and the throwing range. Commercially available foam compositions have also been tested for a comparative study.

AN AGRO-PEDOLOGIC STUDY OF THE SOILS OF SYLHET FOOTHILLS, EAST PAKISTAN

A. KARIM

Department of Soil and Biochemistry, East Pakistan Agricultural University, Mymensingh

AND

M.S. HUSSAIN

Department of Soil Science, Dacca University

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The present investigation deals with the agro-pedologic study of the soils occurring in a portion of the foothills of Sylhet, the major tea-growing area in East Pakistan. The N,P, and K status of the soils was studied on horizon basis to find out the pattern of distribution of these elements.

SHORT COMMUNICATION

UTILIZATION OF D.D.T. WASTE FOR THE SYNTHESIS OF 5-CHLORO-7-IODO-8-HYDROXYQUINOLINE AMOEBICIDE FROM P-DICHLOROBENZENE

MOHAMMAD ZAFAR SHAH, IFTIKHAR AHMAD, M. K. BHATTY AND KARIMULLAH
West Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Lahore

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EFFECT OF HEAT ON PETKOLINS – CHLORINATED PESTICIDES, UNDER ATMOSPHERIC CONDITIONS

SHABBIR AHMAD QURESHI AND JAVED MAHMOOD
Engineering Division, Central Laboratories, Pakistan Council of Scientific and Industrial Research, Karachi.

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THE DISTRIBUTION AND DIAMENSION OF MEDULLATION AND THEIR INTERRELATIONSHIP WITH THE TENSILE PROPERTIES OF HARNAI WOOL FIBRES

TAJ ALI WAZIR AND FAIZULLAH KHAN
Wool Research Division, North Regional Laboratories, Pakistan Council of Scientific and Industrial Research, Peshawar

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BIOCHEMICAL AND NUTRITIONAL INVESTIGATION ON EAST PAKISTAN RICE AND RICE PRODUCTS

Part IV. – Differential Moisture Absorption by Raw and Parboiled Paddy and Rice

H. N. DE AND M. A. REZA ALI
Nutrition and Physics Sections, East Regional Laboratories, Pakistan Council of scientific and Industrial Research, Dacca

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NUTRITIVE VALUE OF EDIBLE WILD PLANTS IN THE FRONTIER REGION OF WEST PAKISTAN

A. K. BALOCH AND S. HUJJATULLAH
North Regional Laboratories, Pakistan Council of Scientific Research, Peshawar

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FUNGUS FLORA OF LAHORE SOILS

MAHBOOB ALAM QURESHI
West Regional Laboratories, Pakistan Council of Scientific Research, Lahore

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