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**MANUFACTURE OF CITRIC ACID FROM MOLASSES**

**Part I.—Isolation of Micro-Organisms Useful in Production of Citric Acid**

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Thirty-two different black molds were isolated from various sources such as local soil, stale lemon pulp, stale pieces of bread, rotting sugar beets and contaminated agar slants; out of these seventeen organisms (apparently distinct) were found capable of producing citric acid. The organisms were isolated by crowded-plate method<sup>1</sup> and they were allowed to act on molasses when citric acid was produced and identified by Deniges' method.<sup>2</sup>

## STUDIES ON INDIGENOUS STARCHES OF PAKISTAN

### Part III.—Photomicrographic and Spectrophotometric Study of the Iodine Complexes of Starches from *Curcuma Zedoaria* (Shati), *Manihot Utilissima* (Tapioca) and *Ipomea Batata* (Sweet Potato)

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The per cent absorption of the complex compound of iodine with starches extracted from *Curcuma zedoaria* (Shati), *Ipomea batata* (sweet potato) and *Manihot utilissima* (Tapioca) grown here were studied within the range of wavelength from 250 to 650  $m\mu$ . The maximum absorption peak in all the cases was noted at  $610 \pm 5$   $m\mu$  and the minimum percent transmission values at this peak were found to be 30.4, 38.5 and 41.8 respectively for the above starches. These showed reciprocal linear relationship with the amylose contents and with sizes of the granules as determined by microphotography.

**BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN FISH****Part VI.—Bacterial Decomposition in Scaly and Non-scaly Fish and Assessment of their Spoilage Mechanism**

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The total bacterial count in gills, intestine, fillet and skin of some scaly and non-scaly fish and also in the scales of the scaly ones was investigated in the fresh and decomposed conditions after storage for 24 hours at the room temperature of 80-85°F. The apparent rate of multiplication of bacteria due to storage of the tissues was also studied. From the results it would appear that skins of the scaly fish showed greater increase of the bacterial population due to storage as compared to those of non-scaly ones. This has ultimately caused higher bacterial invasion in the fillet of the scaly fish. As compared to other tissues, the fillet of both scaly and non-scaly fish and the skin of the scaly fish are considered to be better media for the growth and multiplication of the bacteria. The significance of these results in the assessment of the mechanism of fish spoilage has been discussed.

**BIOCHEMICAL AND NUTRITIONAL STUDIES ON EAST PAKISTAN FISH****Part VII.—Chemical Composition and Quality of the Traditionally Processed Fish**

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Analysis of some samples of sun-dried fish locally known as 'Shutki' from both marine and fresh water sources showed that those which are dried whole, retaining the heads and bony portions, are good sources of both protein and calcium. These may enrich the East Pakistan rice eaters' dietaries which are deficient in both these nutrients. Chemical spoilage tests like the determination of iodine absorption, titratable acidity and tyrosine values, total dehydrogenase activities and the total bacterial count revealed that these products correspond to fresh fish rather than to the decomposed products with respect to the above tests. Smoked product of Puti (*Barbus punctius sophore*) fish, however, responded to the above tests of decomposition.

**STEREOCHEMISTRY OF CAMPHORIC ACID****Part I.—Some Reactions of Inactive Cis and Trans Methyl Hydrogen Camphorate**

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The so called *ortho* and *allo*-methyl hydrogen camphorate have been prepared from *dl*-camphoric acid, their configurations have been re-examined and they have been re-designated *cis* and *trans* methyl hydrogen camphorate respectively on the basis of the reactions of their acid chlorides with bromine, and zinc methyl iodide. The former reaction resulted in the production of bromo camphoric anhydride together with methyl camphanate and some bromo-esters, while the latter reaction gave one and the same ketonic ester. The ketonic ester underwent Dieckman condensation to give 1:1:5-trimethyl-2:5-*bicyclo*-hexane - 6:8-dione. On Clemmenson reduction this dione gave a mixture of three products one of which is 1:1:5-trimethyl -6- keto *bicyclo* hexane.

**REDUCTION OF STIBNITE BY METHANE**

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Reduction of stibnite by methane gives metallic antimony and chiefly hydrogen sulphide. The overall reaction takes place as follows:  $2\text{Sb}_2\text{S}_3 + 3\text{CH}_4 = 4\text{Sb} + 6\text{H}_2\text{S} + 3\text{C}$ . A small portion of hydrogen sulphide reacts with carbon yielding carbon disulphide. Reduction is slow in the range of 480 - 580°C., but can be accelerated by the use of incorporated. Best results are obtained in the presence of active carbon, when virtually complete desulphurization was achieved at 530 - 580°C., in three hours. The reaction is considered suitable for large scale production of antimony.

**COLORIMETRIC DETERMINATION OF SILVER IN GALENA WITH p-DIETHYLAMINO BENZYLIDENERHODANINE**

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Silver is always present in galena, but the quantity greatly varies. Some ores contain only traces, while others may have proportions as high as 0.2%. Samples of galena were procured from different localities in West Pakistan and their silver contents determined. The determination of silver in microgram amounts in the presence of large amount of interfering elements is rather difficult and hence the factors influencing the colorimetric method of determination of silver using p-diethylaminobenzylidenerhodanine has been studied in detail both by the direct and indirect methods. The silver content in Pakistani galena has been found to range from 0.003% to 0.096%.

**CHINA CLAY FROM SALT RANGE AREA**

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Processed clay from Salt Range Area was tested for chemical composition, drying and firing shrinkage, color on firing, plasticity and particle size, porosity, absorption and specific gravity. The standard testing methods were closely followed. Results obtained indicate that the indigenous clay studied can well compete with and be substituted for imported china clay.



## DRUG SURVEY OF WEST PAKISTAN

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An extensive drug survey of West Pakistan was undertaken to find out the quantity of drugs consumed annually by the pharmaceutical industries and to obtain statistical information on marketing. The following findings are reported: (i) The average annual consumption of the crude drugs by 40 pharmaceutical works during the year 1954-58. (ii) Detailed information about the drugs available in Peshawar, Rawalpindi, Lahore, Quetta and Sukkur markets as well as the sources of collection and their disposal is given. (iii) Names of drugs imported from Iran, Afghansitan and India and those exported to India. (iv) Lastly, the information about the methods of collection, storage and the possible adulteration is given.

## VEGETATION OF SWAT VALLEY

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The vegetation of Swat Valley is interesting as there is mixture of plain and hilly plants. The lower portion of the Valley is broad and on low altitude and shows xerophytic types of plants while in the upper portion the vegetation resembles that of Kashmir and Kaghan Valley. In the lower Swat area the vegetation is typically Himalayan but in the upper areas of upper Swat there is a blending of the Mediterranean and Central Asian species because this region is under the influence of Mediterranean climate.

Swat Valley shows a number of vegetation types depending upon the aspect, altitude and slope. The various vegetation types are discussed.

## **CHARACTERISTICS OF HASHTNAGRI WOOL AND ITS STANDARDIZATION FOR CARPET MANUFACTURE**

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Full fleeces of wool obtained from Hashtnagri sheep, habitant of Hashtnagar tract of West Pakistan, were studied. About 25,000 fibres were tested for average fibre diameter; 31,000 for percentage proportion of the four types of fibres, viz., true, heterotypical, medullated and kemp; and 12,000 for fibre diameters as well as fibre lengths of the four types of fibres. Results obtained were standardized against the available standards for an ideal carpet wool. It has been found that the wool satisfies all the conditions for an ideal carpet wool except for the only drawback that the coefficients of variation of the said proportion and dimensions stand higher than the desired limits. Consequently, measures for development have been suggested.

**STUDIES ON THE INFLUENCE OF THE METHODS OF PREPARING  
MALEIC RESINS ON THEIR APPLICATION IN SURFACE COATINGS**

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This paper deals with the various methods of preparing oil soluble maleic resins and their influence on the properties of these resins with respect to their application in surface coatings. Best results are obtained when the three ingredients—rosin, maleic anhydride and glycerol—are reacted under conditions which give the maximum polymerisation, without making the product insoluble in oil. It has been found that this can be achieved by reacting maleic anhydride with a full quantity of glycerol at 200–10°C. for 30 minutes, incorporating rosin and heating the mass at 270–80°C. till there is no further reduction in acid value. Resins thus prepared have higher melting points as well as improved water resistance, and have merely to be dissolved in drying oils for the preparation of oleo-resinous varnishes.

## UTILIZATION OF BALCRETE FOAMING AGENT

### Part II.—Production of Cellular Concrete (with Cement-Sand Mixtures)

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This paper deals with the preparation and the physical properties of moist cured cement sand cellular concrete made with fine and coarse sands, respectively from Ravi and Malir river beds, in different proportions, using an ordinary non-tilting drum concrete mixer. The values for thermal conductivity, moisture penetration, compressive and flexural strengths have been determined for cellular concrete of various densities. It has been found that cellular concrete made with Ravi sand up to cement/aggregate ratio of 1:2 may be used for partition and insulation tiles, whereas with Malir sand it may be precast *in situ* on inaccessible roofs on account of its poor compressive strength.

**EFFECT OF AN ALTERNARIA SP. ON THE DRY WEIGHTS OF COLLETOTRICHUM  
GRAMINICOLA\***

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At a certain range of concentration of an *Alternaria* sp. culture filtrate in yeast extract liquid medium the dry weights of certain isolates of *Colletotrichum graminicola* (Ces.) Wils. were greatly reduced.

## STUDIES IN THE UPGRADING, ESPECIALLY DESULPHURISATION, OF WEST PAKISTAN COALS

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Most of the West Pakistan coals, as mined, have due to a number of unfavourable properties, e.g., high contents of volatile matter, ash and sulphur, a limited scope in regard to their utilisation as solid fuel for the generation of heat in industries and households. Upgrading, particularly by a reduction of volatiles, ash and sulphur is therefore highly desirable. In view of this, studies were undertaken to carbonise 8 West Pakistan coals in the presence of superheated steam in the temperature range of 300 to 600°C. The results show the favourable influence of steam with rising temperature on the reduction of volatile matter and on the various forms of sulphur in all the coals. At 600°C the volatile matter was reduced to around 10% or less in the carbonised residue, for the production of a smokeless fuel, while, at this temperature, upto 95% of the pyritic sulphur, 60 to 70% of the organically bound and sulphate sulphur had been removed, resulting in an overall effect of 80 to 85% of the original total sulphur in the coals eliminated.

**X-RAY STUDY OF THE SYSTEM LEAD MONOXIDE - ANTIMONY PENTOXIDE  
-STANNIC OXIDE\***

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A study of antimony yellow in the system,  $\text{PbO-Sb}_2\text{O}_5\text{-SnO}_2$  was made by X-ray analysis and the spectroreflectance measurements. Seven compositions were tried for investigation at temperatures ranging from 700 C. to 1100 C., and the results indicated that the antimony yellow containing tin oxide is the solid solution of pyrochlore type having the general formula  $\text{A}_2\text{B}_2\text{O}_7$  or  $\text{M}_4\text{O}_7$ .