

## ABSTRACTS

### DEPARTMENT OF BIOCHEMISTRY

1. AMINO ACIDS IN TREATED SEWAGE IN INDIA. C. Anandeswara Sastry, P. V. R. Subrahmanyam and S. C. Pillai, *Sewage and Industrial Wastes*, 1958, 30, 1241-1247.

The quality of sewage effluents in relation to amino acids was studied. The effluents from chemical clarification, mechanical filtration, septic tank and biological filters contained varying amounts of amino acids. The effluents from the activated sludge process and from natural purification of flowing sewage were practically free from amino acids.

2. VITAMIN B<sub>12</sub> IN SEWAGE SLUDGES. S. Sathyanarayana Rao, C. A. Sastry, H. N. Bhagavan and B. R. Baliga, *Science*, 1959, 129, 276.

Raw sewage solids, raw sewage precipitated with lime or alum, septic sludge, activated sludge, *Epistylis* sp. (a protozoan commonly found in activated sludge), and cow dung were examined for vitamin B<sub>12</sub>. Activated sludge contained by far the highest amount of the vitamin. The protozoan contained a considerable amount of the vitamin. The possible use of activated sludge as a supplement to the feeds of animals such as chicks and pigs is indicated.

3. ROLE OF MICRO-ORGANISMS IN SEWAGE PURIFICATION. S. C. Pillai, *Bombay Civic J.*, 1959, 5 (12), 13, 14 & 24.

The advances in regard to the theory and practice of sewage purification are reviewed and the future possibilities indicated.

4. SEWAGE FARMING AND SEWAGE-GROWN CROPS IN RELATION TO HEALTH. S. C. Pillai, R. Rajagopalan and V. Subrahmanyam. *Natl. Inst. Sci. India*, Bulletin No. 10, 1959, Proceedings of the Symposium on Climate, Environment and Health, pp. 160-179.

The paper gives an account of the observations made on land treatment of sewage and sewage farming, particularly from the point of view of the health of the community. The aspects studied include the incidence and control of hookworm in sewage farm soils, the persistence of sewage bacteria in the soils and the crops, resistance of animals to the organisms in sewage and sludges, the soils suited to sewage irrigation, and other conditions for successful farming with sewage.

5. RAPID REMOVAL OF FATTY CONSTITUENTS OF SEWAGE BY ACTIVATED SLUDGE. C. V. Viswanathan and S. C. Pillai, *Naturwissenschaften*, 1959, 46, 324-325.

The rate of removal of fatty matter in sewage by activated sludge was dependent on the amount of sludge. With 20 per cent activated sludge the fatty matter was removed completely from the supernatant liquid in 4 hours. When the activated sludge was warmed at 45°C. for 10 minutes and then aerated with sewage, the removal of fatty matter was adversely affected. When a mixed culture of bacteria from activated sludge was added to the sewage and aerated, the amount of fatty matter removed was much less (about 26 %).

6. RAPID REMOVAL OF PHOSPHORUS FROM SEWAGE BY ACTIVATED SLUDGE. E. G. Srintah, C. A. Sastry and S. C. Pillai, *Experientia*, 1959, 15, 339-340.

It was observed that during the activated sludge process of sewage purification the removal of phosphorus, including the water soluble phosphorus, from the sewage closely followed the rapid rate of clarification and oxidation of sewage and that the rate of removal of phosphorus, as the purification process, depended upon the concentration of sludge. The activity of the bacteria in the sludge did not seem to explain the rapid removal of about 90 per cent of the phosphorus from the sewage.

#### PHARMACOLOGY LABORATORY

1. PHARMACOLOGICAL STUDIES ON *Melia azadirachta*, LINN., N. O. MELIACEAE. Part I—ANTIBACTERIAL, ANTIFUNGAL AND ANTITUBERCULAR ACTIVITY OF NEEM OIL AND ITS FRACTIONS. P. Suryanarayana Murthy and M. Sirsi, *Indian J. Physio. and Pharmacol.*, 1958, 2, 387.

Nimbidin is found to be bactericidal to *Mycobacterium tuberculosis* H<sub>37</sub>R<sub>61</sub> in 1/1000 concentration and tuberculostatic at higher dilutions. It also is fungicidal to *Tinea rubrum*, grown in Sabourad's media. In experimental tuberculosis of mice, nimbidin prolongs the survival period and appears to be as potent as P.A.S. in its action. Neem oil depresses the hypersensitivity to tuberculin in sensitized guinea pigs.

- Part II—ESTROGENIC AND ANTIPIRETTIC ACTIVITY OF NEEM OIL AND ITS FRACTIONS. *Idem.*, *Ibid.*, 1958, 2, 456.

Neem products are considered to be emmenagogues and febrifuges in clinical use. In our studies, by the Allen and Doisy's vaginal cornification

technique, neither neem oil nor the bitter fractions nimbidin and nimbidol exhibited any estrogenic activity.

Nimbidol in 50 mg/kg., was effective in reducing the hyper-pyrexia of rats, induced by injection of yeasts. The antipyretic action was immediate and lasted for a longer period than that due to acetanalide.

Part III—EFFECT OF NEEM OIL AND ITS FRACTIONS ON EXPERIMENTAL AVIAN MALARIA. *Idem.* *J. Mysore Med. Asso.*, 1958, 23, 1.

The oil and its fractionates exhibited slight suppressive action on the *P. gallinaceum* infection in chicks. Nimbidol was found to be more potent than others but was definitely less active than quinine.

2. EFFECTS OF DIETARY FATS IN EXPERIMENTAL TUBERCULOSIS OF MICE. M. Sirsi and T. Ramakrishnan, *J. Indian Med. Asso.*, 1958, 31, 241.

Since lipids are known to affect the 'in vitro' growth of *M. tuberculosis* and to be intimately related in the development of the defensive mechanism of the host, a study of the influence of some different edible oils on the course of experimental tuberculosis in mice has been carried out.

Ground nut oil fed mice showed a significantly longer survival period and decrease in the mortality rate as compared to the coconut oil. Gingelly oil was found to be the least protective of all.

The possible mechanisms of action involved in this suppressive effect, as also the limitations imposed by the experimental design are discussed.

DEPARTMENT OF CHEMICAL TECHNOLOGY AND  
CHEMICAL ENGINEERING

THERMODYNAMICS OF CRACKING AND AROMATISATION OF HIGH BOILING HYDROCARBONS AT ATMOSPHERIC PRESSURE. M. Ramacharyulu and S. S. Ghosh, *Trans., Indian Inst. Chem. Engrs.* 1957-58, 10.

A thermodynamic analysis of the process of conversion of higher boiling paraffinic hydrocarbons into gasolinic fractions of  $C_6$ - $C_9$  boiling range has been made. Several possible schemes of reactions of cracking and aromatisation at atmospheric pressure, of a hydrocarbon feed-stock having an empirical molecular formula of  $C_{12}H_{26}$ , have been postulated and their thermodynamic possibilities discussed in the light of important variables, such as temperature, space velocity and catalyst specificity. From thermodynamic stand point it is seen that several reactions that are undesirable in the present case are serious competitors of the main cracking and aromatisation reactions, so that for effective conversion of

the feed-stock into gasolinic fractions of substantially high aromatised character, besides control of temperature and space velocity, the use of specific catalytic materials becomes indispensable. From theoretical considerations as well as from practical data it has been found that the selective fragmentation of the original hydrocarbon molecule and the subsequent aromatisation of the fragmented products cannot be accomplished by using a single bed of composite catalyst but a two-bed catalyst system should be employed, in which the primary cracking is effected on the bed of a cracking catalyst, such as silica-alumina, and the subsequent dehydrogenation and ring closure of primary cracked products on an aromatising catalyst, such as alumina-chromia.

#### DEPARTMENT OF AERONAUTICAL ENGINEERING

1. **THE PITOT TUBE DISPLACEMENT EFFECT IN BOUNDARY LAYER FLOWS.** S. Dhawan and B. R. Vasudeva, *J. Aeronautical Soc. India*, **11**, No. 1, 1-18.

The displacement effect of pitot tubes in boundary layer flows is investigated analytically and experimentally. Approximate calculations for the shear flow past a two-dimensional circular cylinder and a sphere show the order of magnitude of the displacement to be expected. The wall interference produces negative displacements of the same order for both two- and three dimensional bodies. It is seen that to a good approximation the shear effect and the wall effect are linearly additive. Experiments in a typical laminar and a typical turbulent boundary layer in low speed flow are described which support the calculations. In addition experiments on finite circular cylinders show how the displacements produced by two- and three-dimensional bodies differ. Finally, conventional pitots of the circular and rectangular type are also studied. It is found that in the laminar case both types follow a behaviour predictable from theory and the cylinder experiments. A semi-theoretical explanation is suggested for the displacement of three-dimensional pitots of general shape such as the rectangular flat type. It is found, however, that such pitots show anomalous behaviour in the turbulent boundary layer.

2. **BOUNDARY LAYER AND UPSTREAM INFLUENCES.** A. K. Roy, Proceedings of the Symposium on the Mechanics of Real Fluids in India, 1958, *J. Sci. and Res.*, 1959, **3B**, 190-200.

One of the main complications caused by the boundary layer in a supersonic flow arises from the fact that a portion of the layer is sub-sonic. As a result, the principle used in the analysis of the compressible inviscid flow, that a disturbance to the flow at a point on a body cannot affect the flow up-stream is seriously violated. The subsonic layer forms a channel for these disturbances to propagate along the body. There exist two distinct cases, namely, cases of self-induced and externally induced disturbances.

In the present analysis, an attempt has been made to discuss the results of investigations in the up-stream influences of the disturbances made on boundary layers.

3. ESTIMATION OF THE CRITICAL VISCOUS SUB-LAYER IN SHOCK WAVE BOUNDARY LAYER INTERACTION. A. K. Roy, *Zamp, J. Applied Mathematics and Physics*, 1959, 10, No. 1, 82-89.

If a compressible boundary layer (laminar or turbulent) is subjected to a disturbance either self-induced or externally induced, in the form of shock or expansion waves, the effect of the disturbances will be felt both up and down-stream of the point of incidence of the disturbance on the boundary layer. In the mechanism of the transmission of the disturbance up and down-stream, Lighthill in his mathematical treatment of the problem assumed a very thin viscous sub-layer adjacent to the wall and small enough for the compressibility effects to be neglected, to be responsible for such phenomena. In the present paper, thickness of this critical viscous sub-layer has been estimated on the basis of similarity consideration of Roy (1956) and utilising the existing experimental data. It has been found that the order of the ratio of this critical viscous sub-layer to the total boundary layer thickness (undisturbed) is about one-tenth in the laminar cases and one-hundredth in the turbulent cases.

4. ESTIMATION OF THE CHARACTERISTIC VELOCITY FOR THE PROPAGATION OF THE DISTURBANCE UPSTREAM IN SHOCK WAVE BOUNDARY LAYER INTERACTION PROBLEMS. A. K. Roy, *Proc. National Inst. Sci. India*, 1959, 25A, No. 5, 354-360.

In Shock Boundary Layer Interaction Problems, consideration of the whole of the boundary layer is not essential. The part of the boundary layer termed as the critical viscous sub-layer by the present author, essential for the consideration of the aforesaid problems has already been estimated by the present author.

In the present paper, extending the above work of Roy, the Mach number of the characteristic flow in the region of this viscous sub-layer has been estimated and found to lie between the limits 0.15 to 0.6. Further applying these results, the earlier theory of Tsien and Finston (1949) has been improved.

5. SUPERSONIC VISCOUS FLOW PAST A CONVEX CORNER. A. K. Roy, *Zamp*, 1959, 10, No. 6, 487-500.

In the case of two dimensional viscous supersonic flow past a convex corner, where arises a pure expansion fan, a simple mathematical model has been set up on the assumption that the effect of viscosity in the boundary layer is as if to round off the corner. By applying the boundary layer approximations, a complete solution of the flow parameters has been obtained with different

assumed velocity distributions and the co-ordinates of the virtual point from which the expansion fan originates have been determined.

6. METHOD FOR CALCULATING THE DOWNWASH BEHIND SWEEPBACK WINGS IN SUPERSONIC FLOWS. S. N. Chaudhuri and V. D. S. Prasad, *J. Aeronautical Soc. India*, 1959, 11, No. 3, 68-73.

A simplified method is developed for the calculation of supersonic downwash behind wings of any planform. This is done by replacing the spanwise circulation distribution of the wing by means of Multhopp's interpolation functions. The downwash integrals behind the wing due to these interpolation functions have been reduced to elliptic functions for convenience of tabulation. The downwash behind the wing is obtained by multiplying the tabulated values of downwash by the appropriate spanwise circulations. The downwash calculations made for a sweptback wing show good agreement with those done using Mirles' method and they check very well with the experimental values available up to  $M = 1.15$ .