

## THE BRITISH COKE RESEARCH ASSOCIATION

THE annual report for 1961 of the British Coke Research Association, Chesterfield, is noteworthy not only for the review of progress in all aspects of the Association's recent activities but for special mention of a number of new ventures which were begun during the year\*. Support by the Department of Scientific and Industrial Research had enabled the Association to provide member-organizations with several new services in the field of technical information, the purpose being to further the effect with which the results of research can be applied in industry. The new developments have covered briefly the establishment of a more comprehensive abstracts service, improved technical liaison between the Research Centre and producers and consumers of coke, a field trials officer and a fully equipped mobile laboratory to demonstrate among other activities methods of sampling, analysis and testing of coke, and the assessment of smoke emission from coking plant. The provision of a mobile laboratory for plant trials under industrial conditions is becoming a most valuable instrument of technical advancement in a wide range of practice.

This Association is unique for the fact that it is the only co-operative research organization in the world that is devoted solely to the study of the production of coke and its associated problems. The Research Centre in Chesterfield has accordingly become a focal point for the industry. There is special interest in the fact that the Centre is capable of carrying out modern research on a large scale, as well as the fundamental and applied research that must remain the source of the basic ideas on which progress in many techniques associated with coking plant must depend. The result has been a growing flow of interested visitors from other technical organizations in Britain and overseas.

As to the achievements of the year and the use of the test plant in regard to the improvement in the quality of coke and yield of metallurgical plants, the investigations have been concentrated on the effect of variation of specific operating conditions. Thus the addition of breeze in the charge, pre-drying, the addition of wet or partially dried filter coke, the rate of carbonization and the use of high bulk density. The use of the 10-ton oven in evaluating with an established accuracy the relative merits of such variables defines, in effect, an optimum practice, which could not readily, by other means, be ascertained.

In respect of the fundamental studies of the structure and properties of coke an interesting preliminary investigation has been made of the potentialities of polarized light microscopy for the study of coke structure. The early indications are that the optical method utilized is probably more informative in respect of structural orientations of

\*British Coke Research Association. Eighteenth Annual Report for the year 1961. (Chesterfield: British Coke Research Association, 1962.)

significance than some X-ray techniques, but that its application to technical cokes may be limited by the sampling difficulties. Investigations of magnetic data collected on a variety of cokes and carbons have given rise to tentative conclusions of significance in respect of the reactivity of coke. Thus the magnetic and probably chemical behaviour of high-temperature coke can be attributed, in part, to the excess or deficiency in the mobile electrons normally associated with the graphitic crystallites in the coke. These are influenced in their turn by the origin and temperature of formation of the coke.

The layman may be interested to learn that the subject of the tailoring of the domestic coke to suit the small boiler used for hot-water heating has been receiving important attention. Conclusions relative to the size, shape and ash content of the coke in this context inevitably have their effect on the character of the coke to be found in the market. Most favourable features appear to lie with the  $\frac{3}{4}$ -1-in. coke.

Under the sponsorship of the Association are the liquid effluent studies carried out in the Houldsworth School of the University of Leeds. A particularly valuable service has been the biological assessment of coking-plant wastes in those cases where some form of treatment plant is envisaged. The biological treatment of spent liquor from ammonia stills is a relatively easy matter, but certain rogue liquids also produced in a by-product plant can do permanent damage to the activated sludge. These effects have been traced to the hydrogen sulphide and cyanide contents of the waste liquors.

In the Northern Coke Research Laboratory at Newcastle the research objectives included the study of the structure, reactivity and electron-spin resonance properties of carbons prepared from organic polymers. The maximum free-spin concentrations were shown for carbonization temperatures between 500° and 700° C. Two problems were revealed: (1) in the way in which the unpaired electrons were associated with the carbon structure; (2) in the effect of the heat-treatment temperature of the carbonized products on the observations made. Other experimental techniques would have to be considered in the final interpretation of the observations made, which could be of considerable interest from the point of view of reactivity. As the problem is looked at from the angle of the metallurgist in the manufacture of iron and steel it is a relatively simple matter to produce reactivity, but what is more frequently required, and difficult, is to produce unreactivity. To be able to understand the why and the wherefore is to go a long way towards solving the problem. Further, in respect of the domestic needs, the attainment and control of reactivity in respect of coke supplies is a most important matter, since it controls that most important requirement—the rate at which the fuel burns.

## FOREST PRODUCTS IN CHILE

IN the recently created Instituto Forestal\* in Santiago, Chile, representatives of all Chilean forest products laboratories joined in a conference on the "Co-ordination of Forest Products Research" during August 30-31, 1962.

The Instituto Forestal commenced its activities in November 1961 as the result of an agreement between the Chilean Government and the United Nations (Special Fund and Food and Agriculture Organization). Under its draft statutes, its object is "to contribute to the

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promotion, development, and investigation of the forest resources and industries within the territory of this country [Chile]". It comprises four technical sections, namely, forestry, forest industries, marketing, and extension. Research on forest products is being undertaken in collaboration with established forest products departments in the various universities of the country, as the Instituto does not have its own laboratory.

The purpose of the conference was to co-ordinate research on forest products in Chile, and to agree on a

plan of co-operation, in order to encourage research projects of national importance.

The research needs of the Chilean wood-using industry were presented by A. Pérez, the Institute's officer-in-charge of forest products research. He directed attention to the urgent necessity for applied research and education in the basic conversion processes such as sawmilling, veneer and plywood, preservation, seasoning, and pulping, as well as for fomenting auxiliary industries such as manufacture of adhesives. The Institute's Food and Agriculture Organization adviser on research, Dr. W. G. Kauman (senior research officer, C.S.I.R.O., Division of Forest Products, Australia; on leave of absence), pointed out that of the three main types of research, that is: (1) short-term problem solving; (2) determination of basic properties; (3) academic research, the second constitutes the most urgent task for the university laboratories, but that the third must be given due importance to ensure a future supply of professional and other academic staff.

Prof. G. Mittak, of the recently formed Austral University of Valdivia, emphasized the importance his laboratory is attaching to wood anatomy, in particular identification, and to drying of difficult *Nothofagus* species. For the Catholic University of Santiago, H. Ayarza presented a comparison of the mechanical strength of *Pinus radiata* determined on small clear specimens and on commercial sizes, and work on various timber joints and connectors.

Research on timber in the Institute for Testing Materials in the University of Chile, Santiago, as outlined by H. Albala, is mainly concerned with mechanical strength of Chilean timbers. Due attention is being given to statistical design of the experiments, a factor which has been largely neglected in much of the past work in Chile. Nineteen species have so far been investigated. E. Cuevas presented work on timber physics and preservation in the Forest Engineering School of the University of Chile. Interesting results have been obtained on the frequency distribution of density in fifteen species, and correlations of other properties with density are being examined. E. Bluhm, of the University of Concepción, stated that his laboratory is concentrating on wood chemistry and pulp and paper, and reported a laboratory project on pulping by the nitric acid process. In the Technical University Federico Santa María of Valparaíso, forest products work so far has dealt with pulping, minor forest products and utilization of lignin. Prof. R. Ripa reported on an investigation of production of detergents from sulphonated lignin derivatives. Prof. J. Hirschmann, of the same University, gave details of a new professional course for timber and plastics engineers, now in its third year.

The participants agreed on a plan for co-ordinated research on forest products proposed by Dr. W. G. Kauman, of the Instituto Forestal, and resolved to work in close collaboration to counteract the difficulties created by the dispersion of facilities.

## GAMMA-RAY STERILIZATION OF MEDICAL UTENSILS

THE world's first privately owned cobalt-60 irradiation plant designed specifically for medical purposes began continuous operation on November 10 at Johnson's Ethical Plastics Ltd., Slough. It is to be used to sterilize disposable, or single use, plastic hypodermic syringes. The only other plants which resemble it are the United Kingdom Atomic Energy Authority's experimental unit at Wantage, Berks., and a privately owned installation in Australia used for sterilizing goat hair. The plant at Slough was designed and constructed by H. S. Marsh Ltd., Reading, in collaboration with the United Kingdom Atomic Energy Authority.

The radioactive source which emits the sterilizing  $\gamma$ -rays consists of 120 cobalt rods which have become radioactive by treatment in a nuclear reactor at Calder Hall. The rods have a half-life of five years. The capacity is 50,000 curies, but provision has been made to measure the number of rods to a maximum of 720 with a possible rise to half-a-million curies. The cell in which the cobalt is loaded is a concrete block weighing some 700 tons, and occupying most of the space of the building of 2,500 sq. ft. which houses the plant.

The main object of the disposable or single-use syringes is to reduce or avoid the incidence of cross-infection. Gamma irradiation provides the safest and surest way of assuring sterility. The syringes are made of polystyrene, the grummets of surgical rubber and the needles of stainless steel. It is claimed that it is more economical to use disposable syringes than to wash and clean glass syringes, clean and sharpen needles, and sterilize them by orthodox methods. The present production and sales of disposable syringes is more than 12 million per annum.

At the inauguration luncheon held on November 9 in London the guest of honour was Sir Roger Makins, chairman of the United Kingdom Atomic Energy Authority, and it was announced that to mark the occasion of the opening of the cobalt-60 plant, the Medical College of St. Bartholomew's Hospital, London, had accepted a grant of £2,400 spread over three years made by Johnson's Ethical Plastics Ltd. The money is to be used by Prof. J. Rotblat in the Department of Physics to employ a radio-biologist as assistant in his radiation research.

## RESPONSE OF AN ASTATIC MAGNETOMETER TO A CYLINDRICAL ROCK SPECIMEN

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SPECIMENS of weakly magnetized rocks are often cut in cylindrical form for measurement with an astatic magnetometer. It will be shown here that the response of a two-magnet astatic system depends on the relative dimensions of the specimen, that is, on the ratio of height to radius. A knowledge of the nature of this response variation is important if, as is usually the case with weakly magnetized rocks, the largest possible deflexion for a given intensity of magnetization is required. The standard practice has been to use rock specimens in the

form of thin disks. It is concluded that the height of cylindrical specimens should be comparable with their diameter.

The design theory and description of an astatic magnetometer can be found elsewhere<sup>1-3</sup>. In brief, the intensity and direction of magnetization of a specimen of magnetic moment  $p$  are measured by placing the centre of the specimen at a distance  $z$  below the axis of the lower magnet (of the magnetometer) and at a distance  $x \ll z$  from the plane of magnetization of the magnetometer.