

papers dealt with the analysis of aluminium alloys and steels, the use of the reflected image as an internal standard and a systematic study of iron + nickel + 1 per cent chromium and iron + cobalt + 1 per cent chromium alloys.

Molecular spectroscopy. Analytical applications of emission and absorption spectra in the vacuum ultra-violet were reviewed; photo-ionization of oxygen and other gases was reported in this region of the spectrum, and cross-sections have been calculated from intensity measurements. Other contributions dealt with the structure and composition of siliceous materials, the estimation of the insecticide parathion and the identification of components of fats and metal soaps.

A method of correcting ultra-violet spectra of macromolecules (proteins) for Tyndall or Rayleigh scattering was described. Changes of spectra with pH have been assigned to ionization of phenolic groups of tyrosin in albuminoids. The results given on double bonds in relation to the dependence of Raman line intensities on excitation frequency are not in accord with Placzek's theory. Vibration-rotation bands of C₂, CN, CH and CO in infra-red flame spectra and determinations of flame temperatures were discussed. Microwave data on deuterated derivatives indicate the exact structure of the pyridine molecule, and the effect of solvent and hydrogen bonding on the dipole moment of pyrrole is related to shifts in the NH frequency. Work on hydrogen bonding, particularly water in silica gels, was reviewed. It is concluded from infra-red studies of structure and intermolecular interactions of the amide group that dipole-dipole interaction rather than hydrogen bonding is the controlling factor in polyamide and polypeptide structures. Many overtone and combination bands have been identified in near infra-red spectra of polypeptides and proteins, using polarized radiation. Studies of the spectra of amorphous and crystalline celluloses, using the hydrogen-deuterium exchange, were reported, and the ultra-violet absorption of cellulose xanthogenate has been analysed by analogy with simpler organo-xanthates.

New designs of spectrophotometers and a partly mechanical, partly electronic, 'memory system' for converting a single-beam spectrometer to give percentage absorption traces were described. A punched-card system of documentation was demonstrated, and the 1954 Ohio State meeting was reviewed. In addition, three papers were presented on X-ray fluorescence spectroscopy.

The innovation of holding pre-arranged evening discussions proved successful, and it is hoped to extend this feature on future occasions. The four topics selected were: experiences with methods not requiring standards for comparison, using different techniques; the evaluation of spectrograms (in this discussion the desirability of international standardization of symbols, definitions and analytical methods was stressed and referred for action at the next Colloquium); a comparison of relative sensitivities of the eye, the photographic emulsion and electrical radiation receivers, in spectrophotometric work; and the equipment and technique of Raman spectroscopy—its analytical possibilities and scope in comparison with infra-red methods.

A somewhat fuller summary of the proceedings of the Colloquium, giving the authors and brief notes on the papers presented, is being published in a "Spectroscopic Conferences Supplement" to the

forthcoming December issue (No. 14) of the *British Bulletin of Spectroscopy*. A complete record of the papers and discussions will be published in a special volume of *Microchimica Acta* (Springer-Verlag, Vienna) in 1955. Proposals for the Sixth Colloquium were discussed at a committee meeting attended by delegates from fourteen countries. Possible broadening of the scope to include the physics of spectra, with joint or consecutive meetings with other bodies, was considered. However, it was decided to continue the organization on lines similar to those of previous occasions, but with more emphasis on prearranged discussions on selected topics. It was finally agreed that the next Colloquium should be held in Holland in the autumn of 1956.

D. M. SMITH

APPLIED RESEARCH IN TECHNICAL COLLEGES

A SPECIAL committee of the London and Home Counties Regional Advisory Council for Higher Technological Education has issued a report on applied research in technical colleges*, based on information supplied by seventeen out of the twenty-five colleges in the region approached by the committee. The Council is satisfied that the report covers substantially all the published research undertaken in technical colleges in the region during 1947-52, and some 330 original contributions to scientific or technological knowledge are listed in an appendix, the great majority being in physical, inorganic and, especially, organic chemistry. There is also some bias towards biology; but the Council comments that relatively few of the published researches in organic chemistry appear to have been undertaken in direct co-operation with industry.

An appended list of research projects undertaken at the direct request of industry indicates that technical colleges have helped and are helping in the investigation of engineering problems in circumstances in which no question of publication arises, and a further appendix gives examples of co-operation between technical colleges, research organizations and government departments, including the Department of Scientific and Industrial Research. The Council considers, however, that there is room for a considerable increase in the amount of work done in consultation with industry or for industry's direct benefit, and supports the view that one important function of technical colleges is to train research technologists for industry (especially, perhaps, for the engineering industry) and that fundamental research provides an admirable training in research methods. It suggests that here the technical colleges could be of particular assistance to the small firm, and that the investigations now in progress by part-time students, possibly working for a master's or a doctor's degree, represent a fruitful line of co-operation by which the resources of the colleges may, by agreement, be used by an individual nominated by a firm to conduct a relatively long-term investigation in which the firm is interested. An appendix to the report shows that during the period four doctorates in science, 105 Ph.D.s and 104 M.Sc. degrees of the University of London were awarded for research carried out in the technical colleges of the region.

* Applied Research in Technical Colleges. Pp. 44. (Publication No. 18.) (London: London and Home Counties Regional Advisory Council for Higher Technological Education, 1954.) 2s. 6d.

Since January 1950, about two dozen posts of research assistant or demonstrator have been approved in London and the home counties. Most of these have now been filled, and at about a dozen colleges research by staff and advanced students is accepted as a normal part of the curriculum. At other colleges, research by members of the staff is recorded and the report emphasizes that staff of the calibre required will never be attracted unless some opportunity for original research is provided. The close contact of the staff with neighbouring firms should avoid any difficulty in suggesting lines of investigation likely to be of service to local firms, nor should members of the staff necessarily be required to carry out such research on the college premises.

The evidence shows that departments of chemistry have usually found it easier to provide facilities for research than have departments of engineering, and that the principal obstacle to the further development of industrial research in many technical colleges, even the largest, is lack of laboratory space. This position is attributed partly to the simpler apparatus and less space required in chemical research than in engineering research, and partly also to the absence of sufficient workshop staff; and the Council recommends that the needs of the engineering industry should be kept in mind in allocating research demonstratorships. It also urges authorities to press forward especially with extension plans for those departments in which the standard of work shows that more research could be undertaken successfully in co-operation with industry. Commenting on the circumstances in which staff should be given relief from teaching duties, the Council sees no objection to lecturers undertaking consulting work, and would support *ad hoc* investigations in colleges by members of the staff which are not of the kind that normally lead to publication; it also stresses the importance of personal relations between the colleges and industry.

THE AMERICAN PHYSICAL SOCIETY

REPORT FOR 1953

THE 1954 annual meeting of the American Physical Society was held at Columbia University, New York City, during January 28-30, and the twenty-third annual meeting of the American Association of Physics Teachers was held simultaneously at Columbia University, Barnard College, and the City College of New York. At the joint ceremonial session of the two bodies on January 29, the retiring presidential address of the American Physical Society was delivered by Prof. E. Fermi, of the University of Chicago, who spoke on "What can we Learn with High-energy Accelerators?" The 1953 Oersted Medal of the American Association of Physics Teachers was presented to Prof. C. N. Wall, of the University of Minnesota (*Amer. J. Phys.*, **22**, 363; 1954). The twelfth Richtmyer Memorial Lecture was delivered by Prof. J. A. Wheeler, of Princeton University, who took as his subject "Fields and Particles". At the joint banquet which followed, the after-dinner speakers were Prof. Grayson Kirk, president of Columbia University, who

discussed the position of physics in the social structure, Prof. Leon Brillouin, of International Business Machines Corporation, who spoke of Prof. H. A. Lorentz, and Prof. S. A. Korff, of New York University, who referred to the International Geophysical Year and recounted some of his experiences in a high-altitude laboratory in northern Alaska. The second O. E. Buckley Solid-State Physics Prize was presented to Dr. J. Bardeen, of the University of Illinois, for his outstanding contributions to semiconductor research.

At the business meeting of the Society it was reported that the total membership had reached 11,200, the financial position was satisfactory and that the *Physical Review* continued to expand. The following were elected to hold office for 1954: *President*, H. A. Bethe; *Vice-President*, R. T. Birge; *Secretary*, K. K. Darrow; and *Treasurer*, G. B. Pegram. The annual meeting was again a very large one, with a registration of 2,100 and with more than three hundred contributed papers. Columbia University, which has been host to the Society on many occasions during the past fifty years and in particular for eleven of the past twelve annual meetings, has now reluctantly admitted that such a large convention involves too great a burden, and accordingly it has been agreed to hold the 1955 annual meeting in hotels in the vicinity of Pennsylvania Station, New York City. As a valedictory to Columbia University and as a tribute, which was made doubly fitting by the fact that 1954 is the bicentennial year of the University, a special session of the annual meeting was devoted to a survey of the University's association with physics and with the American Physical Society. This consisted of four addresses and the presentation of a plaque, to be affixed to a wall in the Pupin Physics Laboratories, commemorating the Society's inaugural meeting on May 20, 1899, at Columbia University. Prof. G. B. Pegram reviewed the early years in the history of physics at the University, Prof. E. Fermi the genesis of the nuclear-energy project, Prof. I. I. Rabi the more recent years, and Dr. K. K. Darrow, the Society's secretary, discussed the link between the Society and the University.

The scientific programme of the Physical Society meeting, details of which together with abstracts of the contributed papers are given in the minutes of the meeting (*Phys. Rev.*, **94**, 742; 1954), included a joint session of the Division of Fluid Dynamics and the Institute of the Aeronautical Sciences, at which four papers dealing with high-speed flow phenomena were read; four symposia; a group of four papers in which plans for accelerators of the future, including the designs of the 25-BeV. proton synchrotron for CERN and a 15-BeV. accelerator, were discussed by E. D. Courant, J. P. Blewett, M. S. Livingston and H. G. White; and nineteen invited papers. At the Brookhaven-Nevis symposium the subjects of discussion were the use of the cosmotron as a research tool and the interpretation of high-energy experiments; at the symposium of the Division of Fluid Dynamics there were four papers dealing with aspects of shock waves in liquids and solids; at the symposium of the Division of Electron Physics the conduction mechanism, interface compound formation and noise mechanisms in oxide-coated cathodes together with a review of electronic processes in barium oxide crystals were considered; and at the separate symposium devoted to the subject of nuclear size and density of distribution four differ-