

Papers were read on high alumina cement (T. W. Parker, United Kingdom), slag cements (F. Keil, Germany), expansive cements (Prof. H. Lafuma, France), oil-well cement (W. C. Hansen, U.S.A.) and masonry cement (C. E. Wuerpel, U.S.A.).

The constitution of high-alumina cement is complicated by the division of its fairly high iron content between the ferrous and ferric state. Theories of constitution have, in the past, been based mostly on the results of petrographic examination, since phase-rule studies have not been of great value. At the recent meeting, it was shown that if MgO is used as a 'model substance' for FeO, phase data in the system $\text{CaO}-\text{MgO}-\text{Al}_2\text{O}_3-\text{SiO}_2$ can be applied to this problem. Thus the blue pleochroic mineral described by Sundius and others has been shown to have the composition $6\text{CaO}\cdot 4\text{Al}_2\text{O}_3\cdot \text{FeO}\cdot \text{SiO}_2$. In identifying the calcium ferrites and alumino-ferrites, measurement of reflecting power of the microscopic grains has been found useful.

The principal constituent of slag cements is a glass formed by the rapid quenching in water of molten blast-furnace slag. Such glasses vary widely in their reactivity as cements, and many attempts have been made to relate this activity to chemical composition. Work on artificial glasses containing only a few components was described, and also preliminary attempts to elucidate their structure by chemical means. A number of useful empirical tests for the quality of granulated slag were discussed.

The deliberate production of a controlled expansion is one method of compensating the shrinkage which accompanies the drying of normal cements. For certain applications, such as patching, underpinning and post-stressing, a larger expansion can be produced if necessary. The method employed is to bring about the formation of calcium sulphoaluminate in the set mass; this reaction is the principal cause of the disintegration of concrete in sulphatic waters; but in the present application the expansion is kept under careful control.

Oil-well cements are required to set at considerable depths below the ground under conditions of high temperature and pressure; but the setting time must be long enough for the cement slurry to be pumped down to the required depth. In the paper presented to the symposium, the various organic substances used for regulating the set were classified and it was suggested that HO—C—H groups are particularly effective in retarding the action of water on cement.

For use in masonry jointing or as a rendering, ordinary cement requires to be diluted with lime, limestone or fine sand, to reduce the formation of shrinkage cracks, and to improve the working properties of the mortar. Air-entraining agents may also be added. A modern development is to market the accurately proportioned mixture as masonry cement. Various problems arise in testing such cements, involving a knowledge of the rheological properties of stiff and semi-plastic pastes.

In the final session, the applications of research in cement manufacture were discussed in papers by H. Gygi (Switzerland) and T. Heilmann (Denmark), while A. R. Collins (United Kingdom) and M. A. Swayze (U.S.A.) presented papers on problems in the utilization of cement.

The closing address was given by Dr. F. M. Lea, director of building research, Department of Scientific and Industrial Research, who surveyed the work of the symposium and suggested lines along which

future research might be developed. He referred to the great advances made since the last symposium in the application of X-ray analysis to cement research. One of the most baffling problems in this field has been the determination of the state of the water held in set cement. By means of X-ray structure analysis, it has been shown that some of the water chemically combined can be present as hydroxyl groups and some as molecular water. There must be a relationship between the expanding lattice of the hydrated silicates and shrinkage and moisture movement of concrete. The picture that is emerging as a result of this work and of the physical studies made on cement pastes using the adsorption isotherm technique is much more satisfactory than the earlier theories based solely on capillary phenomena and the Kelvin equation.

The combination of electron microscopy with electron diffraction is proving in this, as in other fields, a powerful research tool, and the use of ultrasonic energy for dispersing material and hastening chemical reaction is of great interest and may possibly have practical applications.

As a result of the research already done, the civil engineer is now presented with a choice of cements eminently suited to particular applications. As old problems are solved, however, new ones arise, and there is a constant need for a background of research in an industry so important as that of cement manufacture.

The proceedings of the Symposium, including the written and spoken discussion, will be published. Inquiries should be made to the Organizing Secretary, P. Gooding, Cement and Concrete Association, 52 Grosvenor Gardens, London, S.W.1. R. W. NURSE

INTERNATIONAL ASTRONOMICAL UNION

THE eighth General Assembly of the International Astronomical Union was held in Rome during September 3-13, on the invitation of the Consiglio Nazionale delle Ricerche. The inaugural ceremony took place in the Hall of Orazi and Curiazi in the Campidoglio, when the Mayor of Rome, the president of the Consiglio Nazionale delle Ricerche, Prof. Gustavo Colonnetti, and the Minister of Education welcomed the Congress, and the president of the Union, Prof. Bertil Lindblad, replied. More than four hundred delegates from thirty-six countries were present. After the opening session of the General Assembly, the Union resolved itself into a number of small groups: thirty-nine commissions of the Union covering all branches of astronomy met either separately for their special work or jointly for discussions of common interest. In addition, two Joint Commissions of the International Council of Scientific Unions—Spectroscopy and Solar and Terrestrial Relationships—took the opportunity of the gathering to hold meetings in Rome at the same time. Further, three symposia were organized, each for a full day. These were on "Stellar Evolution", on "The Astrometry of Faint Stars" and on "Instruments".

The following took part in the first symposium: V. A. Ambartsumian, O. Struve, B. Lindblad, W. Baade, E. Kukarkin, L. Gratton, F. Hoyle, A. Severny, G. A. Shajn, C. Fehrenbach, V. G. Fessenkov, E. Schatzmann, G. P. Kuiper, M. Schwarzschild,

T. Gold, H. Alfvén, R. A. Lyttleton and D. Martynov. The papers of Shajn and Fessenkov were read for them in their absence. The discussion, as may be judged by the names of those taking part, was lively and at times argument was intense; naturally, no decisions were reached, but a most stimulating meeting was held. The importance of Baade's two stellar populations came prominently into view. The chairmen were H. Bondi and O. Struve.

In the second symposium, which was concerned with the positions and motions of faint stars, the chairmen were J. Jackson and A. A. Nemiro. The subject-matter was less controversial, but perhaps more fundamental, than in the case of the first symposium, and the speakers or contributors of papers included M. S. Zverev, A. Blaauw, A. N. Deutsch, A. Kopff, J. Larink, J. H. Oort, E. W. Rybka, S. Vasilevskis, A. N. Vyssotsky, D. Brouwer and R. H. Stoy. In the third symposium E. H. Linfoot, A. Couder, A. Lallemand and I. S. Bowen presented papers on various telescopes and auxiliary apparatus.

Several of the meetings of groups of commissions must be mentioned. The Commissions on Ephemerides, Astronomical Constants, Celestial Mechanics, the Moon, Minor Planets, Comets and Satellites held a joint meeting at which the recommendations were adopted which had been made to the Union by the Paris conference, held in 1950, on the fundamental constants of astronomy. A whole day was devoted to a discussion of the spectra of variable stars at a joint meeting of the Commissions on Variable Stars and Stellar Spectra—more than thirty papers were presented. A joint meeting of the Commissions on Radio-astronomy, Interstellar Matter and Stellar Statistics produced, perhaps, the high lights of the meeting—Oort's account of the possibilities of exploring the dark arms in the Milky Way spiral structure through the use of the 21-cm. line due to atomic hydrogen, and Baade's account of the discovery of rings and wisps of nebulosity surrounding the positions of radio stars located by the observers at Cambridge and Manchester.

During the meeting, visits were paid to the Observatories at Castel Gandolfo and Monte Mario. On the former occasion, His Holiness Pope Pius XII addressed the Union on the progress achieved by astronomy and astrophysics in the past fifty years, and afterwards met individual members and spoke with them on their work.

At the closing session of the Union, a number of recommendations from the Commissions were adopted. Among others, mention must be made of the following: an appeal for observations of the transit of Mercury across the sun's disk in November 1953; an amendment of Brown's Tables of the Moon by removing the empirical term and applying a correction to the mean longitude; an appeal for further work in the southern hemisphere in the field of fundamental meridian astronomy, catalogues of faint stars, and an extension of the Lick sky survey; another appeal for systematic measurements of the general magnetic field of the sun; a suggestion for a joint commission with the Unions of Geodesy and Geophysics and of Radio-Sciences to arrange, possibly in connexion with a proposed International Polar (or Geophysical) Year in 1957-58, for a third set of determinations of an accurate network of world longitude; and a general adoption of the three-letter nomenclature for constellations. Financial recommendations approved by the Finance Committee and adopted included a number of regular items and, in

addition, a grant for the Astronomical News Letters which summarize work published exclusively in Russian; a grant to Meudon Observatory to put into operation the photo-electric photometer of the late Bernard Lyot, for measuring the intensity of solar coronal spectral lines; a grant to P. Swings for the publication of a photographic atlas of typical spectra of comets; and a grant to facilitate the exchange of astronomers between countries.

Invitations for the next General Assembly of the Union had been received from Eire and Poland. A vote by countries was in favour of accepting the invitation from the Dublin Institute for Advanced Studies, and the next General Assembly will be held in Dublin in 1955. The Bureau for the next three years was elected as follows: *President*, O. Struve (U.S.A.); *Vice-Presidents*, V. A. Ambartsumian (U.S.S.R.), A. Couder (France), E. Rybka (Poland), P. Swings (Belgium) and R. v. d. R. Woolley (Australia); *General Secretary*, P. Th. Oosterhoff (Netherlands). The retiring president and secretary, B. Lindblad (Sweden) and B. Strömberg (Denmark and U.S.A.), are *ex officio* members.

The above account indicates clearly the crowded nature of the activities of a very successful meeting. Although the symposia and group meetings were most successful and added greatly to the interest of the meeting, there were signs in several quarters of a tendency to crowd out the administrative organizational work of the separate commissions. This tendency must be watched carefully, as such work is the real fundamental basis of the Union's continued success. No account of the meeting could be regarded as complete without reference to the most generous hospitality received in Rome from the Mayor of Rome and from the Consiglio Nazionale delle Ricerche, who placed every facility at the disposal of the Union.

F. J. M. STRATTON

THE BRITISH PHARMACEUTICAL CONFERENCE, 1952

THE eighty-ninth British Pharmaceutical Conference was opened at Nottingham on September 1 and the attendance exceeded five hundred. The chairman, Mr. H. B. Mackie, approached the subject of pharmaceutical education with originality when he entitled his address: "An Education for a Pharmacist". He pictured the pharmacist as a professional man, comprehending the scientific basis of drugs and drug action, able to evaluate critically the products he handles and competent to advise physicians concerning drugs and their uses.

The early education of the future pharmacist, Mr. Mackie said, should be as broadly based as possible, designed to discover aptitudes and latent potentialities and should seldom degenerate into formalized, didactic instruction. Latin might be restored to its original place, for young people lacking Latin have a hard road to travel to be completely literate. The test of a successful early education is not the amount of knowledge that a pupil takes away from school but his appetite to know and capacity to learn.

Of professional studies, there is little to be said concerning pharmaceutical chemistry—now fairly clearly delimited. Pharmacology and pharmacognosy used in the broadest sense mean the same thing,