enter the publishing field with monographs on specialized subjects.

In conclusion, the President wished the Branch every success with the forthcoming colloquium.

A vote of thanks to Dr Salamon was proposed by Mr G. J. C. Young.

**Closure**

Before declaring the meeting closed, the Chairman reminded those present that the O.F.S. Colloquium would be held on 16th and 17th November, 1977. He thanked Dr Salamon for being present, and the members and visitors for their attendance. The Chairman also thanked the hosts, St. Helena Gold Mines, Limited, for the hospitality accorded to the members on this occasion.

The meeting closed at 8.15 p.m., after which refreshments were served.

# Book review

*Advances in extractive metallurgy, 1977. Proceedings of the third symposium organised by the Institution of Mining and Metallurgy held from 18-20th April 1977.* London, the Institution of Mining and Metallurgy, 1977. 244 pp. £18,50.

This volume contains the thirty papers that were selected by the Organising Committee as best suited to its search for improvements in metallurgical production to counter 'rising energy and labour costs, environmental constraints and ever decreasing ore grades'.

A paper on copper metallurgy is prominently placed, followed by a paper giving a good coverage of lead. Also featured are antimony, beryllium, calcium, cobalt, iron, nickel, silver, titanium, and zinc. Statistically, the emphasis is on pyrometallurgy, followed by hydrometallurgy (chiefly copper) with some accent on electrolysis.

Most of the papers originated in the U.K., eight came from Australia, and the balance, adding useful variety, from nine countries. It would be inappropriate to select any of these excellent papers for separate mention. The overall total is an impressive story of metallurgical success and a triumph for the imaginative planning of the Organising Committee.

This volume earns its place on the bookshelves of every Extraction Metallurgist and in all metallurgical libraries.

(Details of the relative discussions at the symposium and a full index will be available shortly.)

H.B.

# Coal preparation

A meeting of the Organising Committee of the Eighth International Coal Preparation Congress took place in Moscow on 24th and 25th May, 1977. Representatives from Australia, France, FDR, Poland, USSR, USA, and UK attended, and the meeting was chaired by Dr I. G. Blagov, Chief Coal Preparation Engineer for the Mining Ministry, USSR.

It has been agreed that the Eighth Congress will be held in Donetsk in May 1979. The theme of the Congress will be 'Let Coal Preparation have Progressive Techniques and Technology'. The aim of the Congress will be to have detailed discussion on technical and scientific progress in coal preparation and environmental protection. Some 25 to 30 papers will be presented, and the official Congress languages will be English, German, Russian, and French. The main subject headings are as follows:

Preliminary Preparation of Coal
New Coal Preparation Methods
Preparation of Fine Coal
Flotation
Coal Dewatering and Treatment of Fine Effluents
Testing and Control
Utilisation of Refuse
Plant Design
Automation
Organisation of Labour.

Anyone wishing to present a paper will be required to submit a summary of approximately 500 words by 30th November, 1977. Prospective authors should submit six copies of their summaries direct to Mr V. A. Ruban, Congress Secretary, 8th International Coal Preparation Congress, USSR, 117071, MOSCOW B-71, Leninsky Prospect 29.

# NIM reports

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag X3015, Randburg, 2125 South Africa.

**Report no. 1906**

*An automated instrument for measuring the effects of impurities on cathodic-current efficiency during the electrowinning of zinc.* (2nd Sep., 1977).

An instrument is described that measures the cathodic-current efficiency during the electrodeposition of zinc, and that can be used in an assessment of the quality of zinc sulphate electrolytes. The design of the instrument is based upon the galvanostatic deposition and potentiostatic dissolution of zinc onto and from a lead substrate. An analysis of the errors shows the operational error to be less than 0,5 per cent, and a correlation between the results obtained with the instrument and those obtained at a commercial electrowinning plant is provided. Some new information is given on the effects on current efficiency of impurities in a zinc sulphate electrolyte.

**Report no. 1908**

*An analysis of the replies to a questionnaire on materials of construction for ore hoppers.* (16th Sep., 1977).

An analysis and assessment are given of the data supplied by 28 mines in answer to a questionnaire on the metallurgical aspects of materials of construction for ore hoppers.

The replies are classified and discussed under various headings: problems arising from 'sticky ore', variations in capacity, methods of construction, and replaceable wearing plates on hoppers, intervals between major repairs, portions of hoppers requiring repairs or replacements, employment of artisan-aides, possible improvements to the performance and manufacture of hoppers, and costs of maintenance. The data submitted are also given in tabular form.

It is concluded that substantial economies could be effected by rationalization of the design of hoppers and manufacturing techniques, and that there are possibilities for further research into the formulation of specifications for materials of construction, and for joint programmes for the testing of new materials and designs.

The questionnaire is given in an appendix.

**Report no. 1913**

*The mechanism and rate of reduction of Mamatwan manganese-ore fines by carbon.* (2nd Sep., 1977).

Samples (15 to 20 g) of pre-calcined Mamatwan manganese ore or pure $Mn_3O_4$ smaller than 48 mesh were reacted at temperatures in the range 1000 to 1300 °C with samples of spectrographically pure graphite smaller than 325 mesh. In addition, 1 g samples of ore or pure $MnO_2$ smaller than 48 mesh were reacted at temperatures of 1000 and 1200 °C with pure graphite fines in argon, with graphite in carbon monoxide, and with carbon monoxide alone. The loss of mass as a function of time was recorded with a thermobalance.

The rate and degree of reduction were found to increase with increased additions of carbon and with increasing temperature up to 1300 °C, where they reached a maximum. The shape of the reduction curves, together with the results obtained from examination of the product of reaction by microscopy and X-ray diffraction, was used as the basis for a postulated reduction mechanism. Some details are given of an initial kinetic model that was used to verify the proposed mechanism and to indicate the possible rate-controlling mechanisms.

The reduction of Mamatwan ore by graphite at temperatures in the range 1000 to 1300 °C occurs in two stages.

(i) Initially, the higher oxides of manganese are rapidly reduced to MnO with concurrent formation of $CaMn_2O_4$. During this first stage, control appears to be mixed, and the rate of the reduction reaction and the diffusion of gaseous species both influence the overall rate of reaction.

(ii) During the second, slower stage, the $CaMn_2O_4$ and MnO are reduced to carbides by carbon dissolved in the ferromanganese phase. Here, the chemical reaction between the oxide and the carbon appeared to be the rate-controlling step.

**Report no. 1914**

*The thermodynamics of the formation of sulphate complexes of iron (III), cobalt (II), iron (II), manganese (II), and copper (II) in perchlorate medium.* (15th Sep., 1977).

The sulphate complexes of the transition-metal ions $Mn^{2+}$, $Fe^{2+}$, $Co^{2+}$, $Ni^{2+}$, and $Cu^{2+}$ have been shown to be predominantly outer sphere, and the $FeSO^{+}_{4}$ complex has been classified as inner sphere for ionic strengths of 0 and 5 at 25 °C. At an ionic strength of 0, a linear free-energy relation between log $X_1$ for the formation of the sulphate and that for the monohydroxy complexes allowed the classifications to be rationalized.

The inner- and outer-sphere character of the species at an ionic strength of 5, deduced from spectrophotometric measurements of the formation constants, was similar to the pattern at an ionic strength of 0. Large decreases in the entropy of formation of both inner- and outer-sphere species are attributed mainly to the reduced influence of the sulphate ligand on the structure of the medium.

The importance of thermodynamic data to extractive metallurgy is discussed. Conditions are indicated for the acceptance and calculation of formation constants for application to specific values of the ionic strength and temperature used in a process where the values for measurement of the constant are different.

**Report no. 1924**

*The composition of chromite grains from various Witwatersrand reefs.* (23rd Sep., 1977).

An electron microprobe was used for the quantitative analyses of 102 grains of chromite from various gold-bearing reefs in the Witwatersrand Supergroup. Analyses were done for chromium, iron, titanium, manganese, aluminium, magnesium, and zinc.

Considerable variation was found in the composition of the grains, i.e., variations of 39 to 60 per cent for chromium, 12 to 47 per cent for iron, and 0,1 to 20 per cent for aluminium and magnesium.

The large variation in composition of the grains of chromite indicates that they originate from different source rocks, and were possibly altered to a certain extent *in situ*.

# Atomic absorption

The Perkin-Elmer Corporation of South Africa is planning to hold an Atomic Absorption Autumn School in Cape Town from 10th to 13th April, 1978.

The course will cover the following topics:

*Basic Theory*
Excitation, emission, and absorption
Line widths and light sources
Optical Systems
Detection and electronics systems
Atomizers, Flame
History, theory and practice, interferences and their control
Atomizers, Furnace
History, theory and practice, interferences and their control
Atomizers, other
Cold vapour — mercury
Hydride methods
Cathodic sputtering.
*Techniques and Applications*
Determination of major constituents
Determination of minor constituents
Determination of trace and ultra-trace elements
Sample preparation
Standardization and standard preparation.
*Discussion sessions*
Metallurgy (primary and secondary)
Oil analysis
Plant and soil analysis
Biological analysis
Water analysis.

Further details are available from Perkin-Elmer, P.O. Box 50136, New Redruth 1452.

# Travel bursaries

Two Atlas Copco travel bursaries for study tours of Swedish mines may be awarded annually to young mining graduates. One bursary is open to engineers in any country who have at least three years' practical mining experience; the second bursary will be awarded to an engineer who is studying at a British university and has a minimum of one year's practical mining experience.

The awards, which were established by the Atlas Copco organization in collaboration with the Swedish Mining Association, will comprise a three- to four-week tour of Swedish mining operations in the month of September in the year of the award. Return travel expenses from any country will be paid for one bursar and from London for the bursar wngaged in post-graduate work at a British university; accommodation expenses will be met for both bursars. The Council of the Institution of Mining and Metallurgy is responsible for the selection of the bursars, who will be required to present a written report to the Institution, before 1st December in the year of the award, on any aspect of Swedish mining practice, methods, or organization that they found of particular interest. Application forms are available from the Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, before 15th March each year.

# Stability in coal mining

The First International Symposium on the above subject is to be held in Vancouver (Canada) on 5th to 7th April, 1978. Special sessions will be held on

Strip and open-pit mining
Underground mining
Waste disposal
Reclamation.

The symposium will feature international specialists as invited Keynote Speakers and solicited papers dealing with investigations, design, installation and construction, stabilization, and regulations. The major emphasis will be placed on case examples from around the world.

Enquiries should be directed to SYMPOSIUM — Stability in Coal Mining, 224 West 8th Avenue, Vancouver, B.C., Canada, V5Y 1N5.