

briefly the manufacture of aluminium in an electrolytic reduction plant and, in some detail, the sampling procedures used for the quality control of raw materials, intermediate products, and final products, and for the pollution control of waste products. A feature of most of the sampling operations is that they concern materials (e.g., alumina and petroleum coke) that are of high purity and homogeneous composition, so that the sampling methods are relatively simple and small amounts of sample are taken from large batches of material by manual methods. Of special interest to those who are normally concerned with the sampling of ores and concentrates are the methods used for the sampling of coal-tar pitch (by a heated ladle), bagged materials such as cryolite (by a specially designed sampling spear), molten electrolyte at a temperature of 975 °C (by sampling tongs), and molten aluminium (by an open ladle). Other materials that have to be sampled and analysed include anodes, flue gases, alloys, the discharge from roof louvres, grasses growing in adjacent fields, bone sections from animals grazing in the neighbourhood, and the urine of plant personnel.

(vii) The seventh and last paper in the collection has the title 'Establishment and control of the sampling procedure for bulk materials' and is by Kaoru Ishikawa. It discusses some of the factors that must be taken into account in the preparation of standard sampling procedures, and summarizes the standards established by the Union of Japanese Scientists and Engineers, with special reference to iron ores. Some of the Japanese standards are compared with the corresponding international standards (I.S.O.), and small differences are observed. Attention is drawn to the need for the checking of sampling and preparation methods from time to time to ensure their continued accuracy; the procedures for checking are described in both the Japanese and international standards.

* * *

The seven papers comprising this publication cover a wide range of topics, and the sampling problems encountered in most metallurgical operations could be related to the information given in one or other of the papers. Metallurgists in South Africa would probably think that papers on sampling in diamond concentration and in gold extraction

could have been justified because of the distinctive problems encountered in these fields. Another topic that would have been of interest is the continuous sampling of pulp for on-line analyses. (Periodic sampling of a pulp stream is mentioned briefly in two papers, and a passing reference to sampling for on-line analysis is made in another.)

The importance of mixing as a component of sampling is shown in three of the papers presented, and the difficulties created by variations of the feed are described equally frequently. This suggests that increased attention to the mixing and blending of mill feed might be advantageous, and that a paper on this topic may have been a stimulus to the consideration of the possible benefits to be derived from the more extensive application of *ore blending*.

Readers of the papers will come across procedures and techniques that may invite questions or discussion, and it may be that many of these points were raised at the meeting at which the papers were introduced. It is felt that the inclusion of the discussion with the papers could only have added to the value of the very informative publication.

J.L.

Notices

COMPETITION FOR STUDENT MEMBERS OF THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY

Each year the Institute offers a prize (or prizes should the entries warrant it) of up to R100 for the best paper or dissertation on a topic appropriate to the interests of the Institute. The competition is open to all Student Members of the Institute.

A Student Member who is in full-time study at a university may submit the dissertation or thesis he has to write in part fulfilment of his university degree, provided that it is presented in a manner and on a topic suitable for publication in the Journal.

Entries for 1973 should reach the Institute by 31st December, 1973.

APPLICATION AND PRACTICAL OPERATION OF HYDROCYCLONES

Dr H. F. Trawinski of Amberger Kaolinwerke, Hirschau, West Germany, gave a very interesting lecture on this subject to an audience of over one hundred, composed largely of members of the Institute, on 15th August, 1973, at the University of the Witwatersrand. This was a very practical, down-to-earth account of the application and operation of hydrocyclones, with some very clear and explicit illustrations of the dangers that may arise through ignorance of some of the principles involved in the operation.

Possibly the most interesting feature of the talk was the account

of the development of the spider grouping of small cyclones, which results in efficient separations at very small particle sizes.

ROTARY INTERNATIONAL

Applications are invited before 15th March, 1974, for the following awards of The Rotary Foundation:

- Post-graduate Fellowships
- Under-graduate Scholarships
- Awards for Technical Training
- Awards for Teachers of the Handicapped.

Awards are for *overseas* study and will cover the period September 1975 to June 1976 (or, in the Southern Hemisphere, the calendar year 1975).

Awards cover all costs of tuition, board and lodging, and travel, and each is worth approximately R4500.

Relatives of Rotarians are not eligible. Enquiries may be directed

to Mr Mello MacRobert, Adams & Adams, P.O. Box 1014, Pretoria.

NIM REPORTS

The following reports are available free of charge from the National Institute for Metallurgy, Private Bag 7, Auckland Park, Johannesburg.

Report No. 1509

The instrumentation developed for electrochemical studies of the leaching of uranium dioxide.

Electrodes, prepared from UO_2 , with resistances varying from 20 to 4000 ohms were used in electrochemical studies, and a potentiostat capable of compensating for the total ohmic cell resistance, including the electrode and solution resistance, had to be built. This unwanted resistance had to be measured accurately so that the correct value of compensation could be applied to the potentiostat, and an ideal method, which makes use of a constant-current circuit and an interrupter, was developed. This new method can be applied universally and has no obvious disadvantages. A novel sweep generator, which is especially useful for slow-sweep voltammetric studies, was designed for use in conjunction with the new method.

Report No. 1550

A fundamental study of the dissolution in acid solutions of uranium minerals from South African ores.

The leaching behaviour of a number of uranium ores and samples was studied by use of a novel leaching technique known as 'dilute' leaching, which achieved almost complete dissolution of the uranium when the acid and oxidant concentrations of the leach were low. A major factor inhibiting the dissolution of uranium ores in practice seems to be the presence of phosphate, which is derived from the ores and appears in the leaching solutions. The deleterious effect of phosphate ions in relatively low concentrations is attributed to their inhibiting action on a secondary uranium mineral that is derived from the uraninite (UO_2) during the

leaching process. The dissolution rates of UO_2 in ferric sulphate solutions were found to vary considerably, and factors affecting the rate of transfer of electrons were shown to be of major significance in the overall dissolution of UO_2 . For perchlorate and sulphate solutions, the dissolution rate reached a maximum when the pH value was about 2.

Report No. 1552

The preparation and analysis of minerals for use as reference material. Progress report No. 2.

This report covers the progress made in the collection of the reference samples, the three interlaboratory analytical programmes (ferrochromium slags, rare earths, and fluorspar), and the preparation of 'mixed' NIMROC samples, which have been used to determine the efficiency of X-ray-fluorescence analysis under routine conditions. Additional results for thorium, rare earths, tin, tantalum, and niobium for the appropriate reference samples are included in a revised table.

Report No. 1556

The spectral analysis of solutions. 2. The analysis of leach liquors, concentrates, slags, and residues.

This report deals with the practical application of the plasma-jet technique of spectrochemical analysis to the determination of the following: iron and chromium in leach liquor from chromite ore; major base metals in leach liquor from chlorinated chromite ore; silicon, aluminium, calcium, magnesium, and iron in cleaner concentrates, slags, and tailings; and platinum-group metals and gold in synthetic solutions. Brief details of the methods used for the different types of samples are given. Except for the determination of platinum-group metals and gold in the presence of base metals, the method was generally satisfactory, being more precise and reliable than the technique in which a d.c. arc is used on a powdered sample. However, the sensitivity is not as good and the limits of detection are not as low. These dis-

advantages will probably be overcome by the use of the recently developed induction-coupled high-frequency plasma torch.

Report No. 1559

A cost assessment of the production of elemental sulphur by chlorination roasting.

Of the three processes previously investigated for the recovery of elemental sulphur from a pyrite concentrate produced at the Prieska Mine, the chlorination-roasting process was the most promising. It is considered here in more detail for a plant situated at Prieska and producing 348 500 or 208 000 tonnes of sulphur per annum, and also for a plant situated closer to the inland sulphur markets and producing 208 000 tonnes of sulphur per annum.

This process offers a solution to the potential fire and pollution problem posed by the zinc flotation tailings, and the cost of the elemental sulphur produced is lower than that of imported sulphur at the inland sulphur markets. The total capital cost of the plant is estimated to vary between R8,7 and R12,1 million, and the net operating cost is estimated as R10,16 to R19,12 per tonne of sulphur, depending on the capacity and situation of the plant.

Report No. 1562

Application of a flotation model to an industrial plant

This report describes how the validity of a mathematical model making use of basic data that characterize the physical and flotation-kinetic properties of the ground ore was demonstrated by a sampling and measuring programme on the cleaner bank at a copper mill. The model provided good simulations of the plant, its predictions of the mass flowrate of solids in the concentrate streams, and of the overall grades of the plant, being particularly good. The simulations were found to be very convenient for the investigation of various plant configurations and conditions.

Company affiliates

The following members have been admitted to the Institute as Company Affiliates.

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