

## BOOK REVIEW

**Proceedings, 4th International Congress for the Study of Bauxites, Alumina and Aluminum. Vol. 1, Bauxites; Vol. 2, Bauxites; Vol. 3, Alumina and Aluminum.** Soft cover, 1517 pp., \$10.00/volume, advanced payment required. Available from Prof. Dr. S. S. Augustithis, National Technical University, Department of Mineralogy-Petrology-Geology, 42, October 28th Street, P.O. Box 1482, Athens, Greece.

The proceedings of the 4th International Congress for the Study of Bauxites, Alumina and Aluminum (ICSOBA) in Athens, Greece, October 9-12, 1979, reflects the highly technical and topical nature of the interests of its membership. The participation of scientists and technologists in this conference from all phases of the aluminum business testifies to the international nature of this extractive industry and demonstrates the interdependence of both the developed and the developing countries in this resource-based industry.

The proceedings are in four soft-cover volumes; Volume I (472 pp.) "Bauxites"; Volume II (561 pp.) "Bauxites"; Volume III (484 pp.) "Alumina and Aluminum"; and a fourth volume still to be issued. The 66 papers included in Volumes I and II are, of course, of greatest interest to clay scientists. While it is impossible to review every paper, the following articles illustrate the highlights of the proceedings. H. R. Hose attempts an interesting synthesis of the karst bauxites and correlates their occurrences with island arcs using the Pacific and Caribbean deposits as areas where karst bauxitization is still occurring. He suggests that for primary bauxitization to occur, pure limestone has to be uplifted by block faulting or doming to form an island with luxurious tropical or subtropical vegetation, vertical drainage, and chemical erosion of the limestones. "The residual products of this process, primary bauxites, must be uncontaminated by alluvial or other continental sedimentary material; otherwise they are degraded to bauxitic clay." The formation of boehmitic karst bauxites from the primary bauxites is by sinking or base levelling to near sea level and by reworking in infratidal flats and lagoons before total submergence. The aluminous source material is suggested to be volcanic material trapped in the limestone during its deposition, and he postulates that the mechanism operated during the formation of Mediterranean bauxite. I should add that pisolitic bauxites occur in the Essex Valley area of St. Elizabeth, Mocho Mountain deposits and parts of Belmont, Jamaica.

A. Susnjara and B. Scavnicar, on the basis of provenance indices of the Tertiary bauxites in Dalmatia (Yugoslavia), suggest that there are different bauxite precursors, with pyroclastic and detrital material being the major sources. However, unlike Hose they suggest that wind-blown ash fell on the islands, mixed with weathering crust material and was subjected to bauxitization. In contrast, Fabijan Trubelja in his paper "The lateritic crust on the Jablanica Gabbro Massif and its importance for the genesis of bauxites in the Karst of Dinarides," draws attention to the possibility of laterization of aluminosilicate rocks and the transport of the weathering product into the limestone, which simply serves as a container. All together these papers present new and interesting information on Karst bauxitization.

In an important paper on "The global-law governed nature of the development of bauxite and alunite deposits," R. J. Sklijarov divides bauxites and alunite into the following provinces: (1) Pacific, (2) India, (3) Atlantic, (4) Arctic, (5) Urelo-Enisei, and (6) Mediterranean, and concludes that these minerals are indicators of the coastal zones of continents. The

descriptions of the new bauxite deposits in India and South America add to the importance of the volumes.

In the more economic and applied vein, Jurgen Lotze in a paper entitled: "Economic evaluation of world bauxite resources," estimates that there are  $38 \times 10^9$  metric tons of which  $36 \times 10^9$  tons are in the western world. He subdivides these resources on the basis of estimated processing costs, and concludes that only about 12% of the total resources belong to the lowest cost category; so these will most likely be in short supply necessitating the processing of higher costs deposits in the future. He suggests that it is this fact that is generating increasing interest in non-bauxitic raw materials, which are available in abundance in the industrialized countries. The probability of shortage of low-cost bauxite and other factors are undoubtedly responsible for the increased interest in non-bauxitic aluminum ores, as described in the following papers: (1) "Mining and mineralogical problems related to the exploitation of raw-materials substitute for bauxite," by Paolo Mascacci, (2) "Possible utilization of some Spanish Tertiary clays as alumina ore," by C. Brime, J. P. Sancho, and R. Verdeja, (3) "Potential exploitation of leucite-bearing rocks for alumina extraction—A laboratory approach," by A. Cocco, I. Colussi, and S. Meriani, (4) "Extraction of alumina from Canadian non-bauxite materials," by C. A. Hamar, D. H. H. Quon, and A. A. Winer, (5) "New extraction technique for alumina from coal ash," by W. H. Huang.

One paper in Volume I and several in Volume II describe the development of more energy-efficient technology for the extraction of aluminum from bauxites, and include "Computerized evaluation of the operation mechanism of digester-lines in alumina plants by mathematical modelling" by Ivan Korcsmaros; "Some fundamental research for alumina industry in Hungary" by Z. G. Szobo, M. Orba, and I. Perl; and "Complex development of alumina processing in Hungary" by Adam Juhasz. The extraction of non-alumina components is treated in "Comportement du vanadium au cours du traitement de la bauxite dans le Combinat de l'Aluminium de Titograd, et possibilité de récupération" by Cirilo Jelacic and Andric Zivko; "The obtaining of zirconium from red mud and bauxite during complex processing" by V. G. Logomerac, J. J. Crnko, and Z. M. Lenhard; and "The use of Greek bauxites and raw-material for the refracting industry," by D. Tsulikis, E. Mposkow, and A. Ygenopoulos. In view of this interest, the trace-element studies of Zoran Maksimovic and Gyorgy Panto in "Minerals of the rare earth elements in karstic bauxites: Synchisite-Nd, a new mineral from Grebnik deposit" becomes more than an academic study.

The major adverse comment is that the articles are completely unedited and have been printed directly from the authors' manuscript copies. Some of this may be overlooked since for most of the authors, English is a second language. There is also the advantage of early publication of the proceedings at the relatively low cost of \$10.00 per volume. In conclusion, the volumes make a useful addition to the libraries of those with a serious interest in bauxite and the aluminum industry.

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