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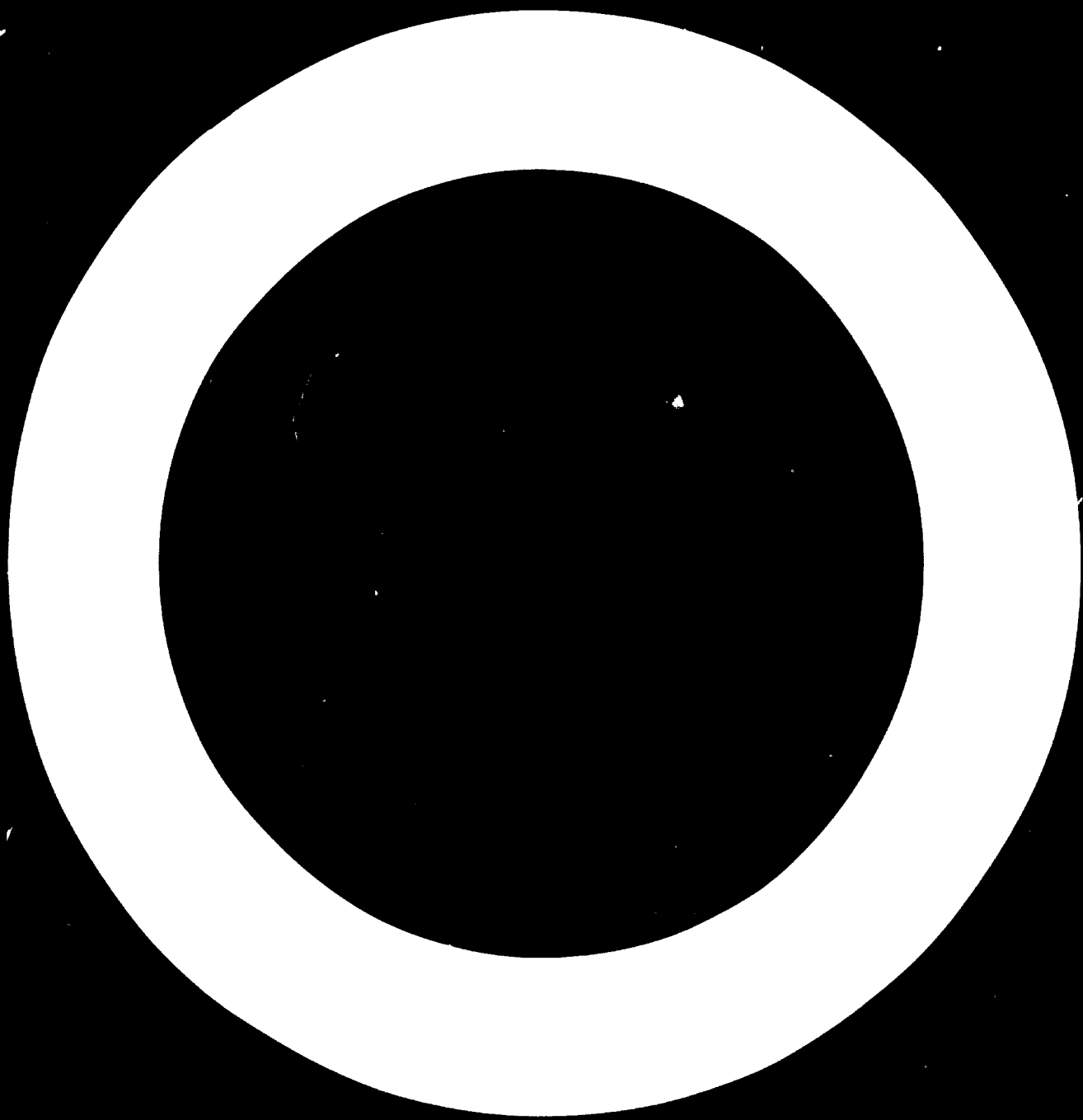
SELECT AND ANNOTATED BIBLIOGRAPHY ON  
BAUXITE \* . (

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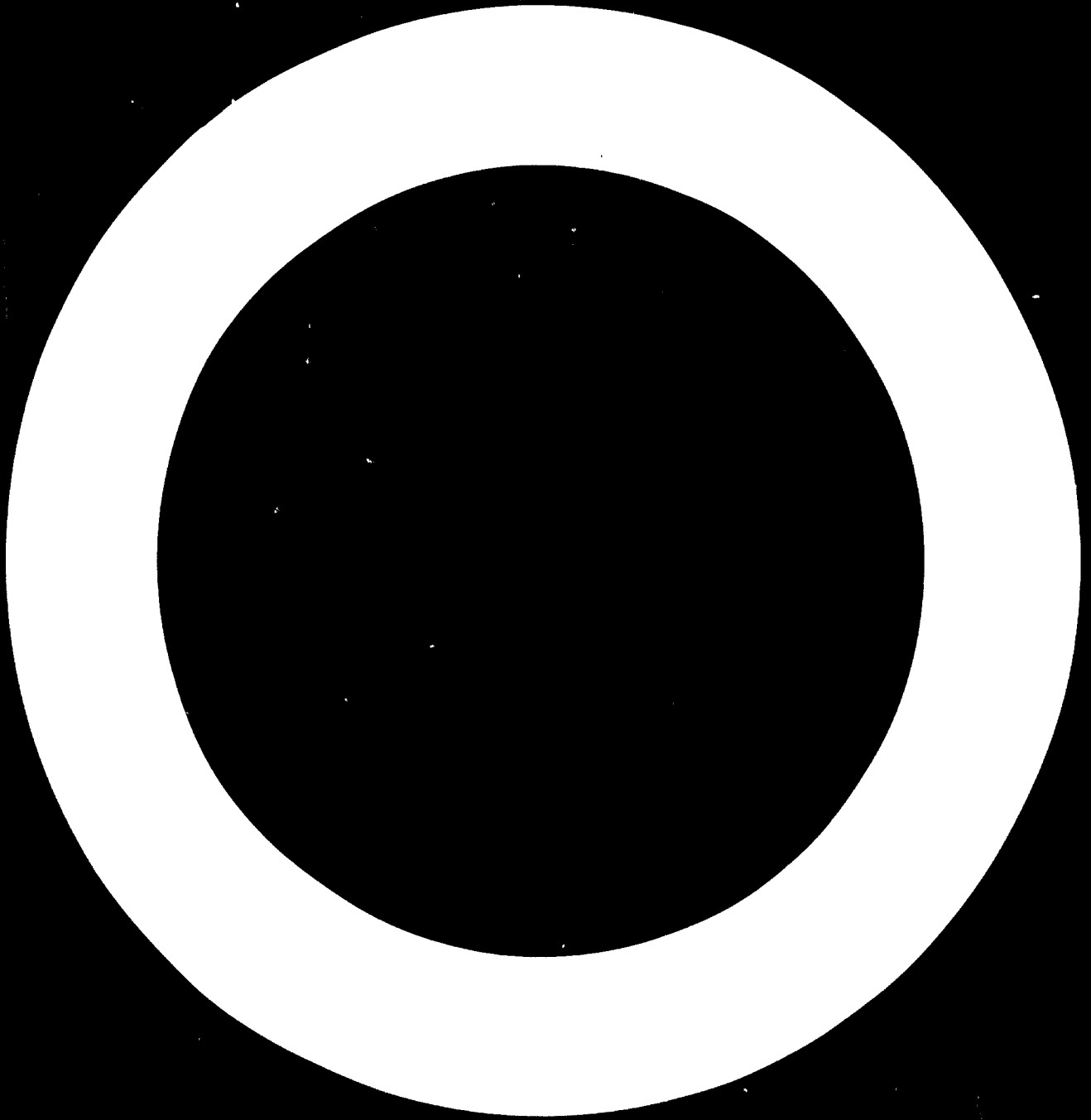
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1. GENERAL INFORMATION. GENESIS, GEOCHEMICAL ASPECTS, ETC.

1. AKAEMOV, S.T.: Lithology and genesis of the bauxites of Sangaredy. In: Problemy Genezisa Boksitov, Moskva, 1975. Nauka. pp. 235-246. /Russian/  
Three layers of bauxites are present in the Sangaredy /Boke region of Western Guinea/ deposit. The rhythmicity and lenticular character of interlayers, the presence of cross-bedding and the sorting and roundness of bauxite material indicate the first /uppermost/ bauxite layer forms part of the faces of an alluvial complex. Relatively good sorting of flat bauxite pebbles, forming the lithologically persistent middle layer, indicates a coastal-marine /beach/ origin.
2. Aluminium and alloys: Raw materials. In: KIRK-OTHELER: Encyclopedia of chemical technology. Vol. 1. New-York-London. 1963. Intersc. Publ., pp. 931-936.  
Bauxite. World distribution of bauxite. Europe. North and South America. Union of Soviet Socialist Republics. Africa. Asia. Australia.
3. ATABEY, M.E.: Mineralogy, chemistry, and origin of the Mortas bauxite deposit. Turk.Jeol.Kurumu.Bul. Vol. 19. No.1. 1976. pp. 9-14. /Turkish/  
The bauxite deposit occurs along an unconformity between Lower and Upper Cretaceous limestones. It contains mainly boehmite, with minor diasporite, gibbsite, kaolinite, montmorillonite, hematite, goethite and anatase. The deposits were derived from limestone.
4. BALASUBRAMANIAM, E.S.; PAROPKARI, A.L.: Mineralogy and genesis of bauxites of Nagardaswadi Plateau, Kolhapur district, Maharashtra State /India/. Canadian Mineralogist, Vol.13. Part.3. 1975. pp. 222-226.  
The geological setting, mineralogy and genesis of a blanket-type bauxite deposit found in the Nagardaswadi Plateau. Physical properties, pH, petrography, thermal characteristics, and minor element contents of the bauxites were studied relative to elevation in the profile.
5. BALLA, Z.: Secondary quartzites of Eastern Mongolia. Geologija Rudnyh Mestrostzdenii, Vol.16. No.5. 1974. pp. 95-97. /Russian/  
The secondary quartzites /Q<sub>s</sub>/ are metasomatites consisting of quartz and numerous Al containing minerals /andalusite, diasporite, pyrophyllite, kaolinite and alunite/. Two types of Q<sub>s</sub> were distinguished based on

microscopic data: alunite-kaolinite type with agalmatolite, formed from granites and the diaspore-pyrophyllite to andalusite-saricite type with or without alunite and formed from acidic or intermediate composition volcanic rocks.

6. BARDOSSY, Gy.; BONI, M.: The bauxite desposits in South Italy. New Results Concerning Their Mineralogical and Petrographic Compositions. Erz-mstall, Vol.29. No.9. 1976. pp. 411-415. /German/

A new summary is presented of the bauxite deposits of central and southern Italy which also contains mineralogical and geochemical data. The bauxite found in this area consists almost exclusively of boehmite /maximum 77%/ with differing contents of kaolinite, other clay minerals hematite, goethite, carbonates and Ti minerals.

7. BARDOSSY, Gy.: Bibliography of papers on bauxite published in Russian. 1965-1968. Sci. Arts, Trav.Com.Intl. Etude Bauxites, Oxydes, Hydroxydes Aluminium, No.8. 1971. pp. 23-24. /French/

8. Bauxite in Europe. Soc. Aluminium Pechiney. Industrie Minerale, Vol.57. No.12. 1975. pp. 543-549. /French/

The total 1972 bauxite reserves are indicated by continent and details are given for France and European bauxite producers. A similar table shows production in 1963, 1968 and 1973 and another traces movements between producers and consumers. The situation of France and various producing countries is considered with regard to the future of mines, supplies and pressing works.

9. BELJAEV, A.A. et alii: Geology and main nonmetallic minerals in the Western Republic of Guinea. Geologičeskis Poiski i Razvedka Nerudn Pomeznyh Iskopaenyh, Vol.1. 1974. pp. 79-94. /Russian/

A review is presented on the geological and nonmetallic deposits in western Guinea. Emphasis is on those deposits which are slated for mining in the near future, with special attention to bauxite in which Guinea is especially rich.

10. BENESLAVSKIJ, S.I.: Mineralogy of bauxites. Moskva. 1963. Gosteoltekhizdat. 169 pp.

Mineral composition, chemical composition, geochemistry of bauxites, classification /mineralogical and industrial/.

11. BENESLAVSKIJ, S.I.: Mineralogy of bauxites. /Criteria for Evaluating the Quality and Technological Properties of Bauxite Ores According to Their Composition./ 2. Ed. Moskva, 1974. Nedza. 168 pp. /Russian/

12. BUSHINSKY, G.I.: Types of karst bauxite deposits and their genesis. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb 1-3 Oct. 1963. Zagreb. 1964. Acad.Yougoslave Sci.Arts. Vol.1. Zagreb, 1964. pp. 93-105.

This paper deals with karst bauxites which are usually called terrarossa type bauxites. Their characteristic feature is that they occur on the karst surface of limestones and dolomites. According to the mode of occurrence all the karst bauxites can be classified into two types: areal and near-contact bauxites. The hydromica terra rossa has nothing in common with bauxites as to its origin but both of them have a similar red colour and are characterized by analogous conditions of their deposition.

13. DENNIS, W.H.: Extractive metallurgy. Principles and application. London, 1965. Sir Isaac Pitman and Sons, Ltd. 367 pp.

This book deals primarily with that branch of metallurgy which is concerned with the extraction of metals from their ores. It embraces the occurrence of metals, ore concentration, extraction and refining of the metals, and ends with final casting of the metal ingot and by-products.

14. CABALLERO, A. et alii: Spanish bauxite and alunite deposits. Boletín de Geología Minero, Vol.85. No.1. 1974. pp.32-42.

A review is presented on the history, geography, geology, mineralogy, chemical, composition, genesis, economic value and reserves of Spanish bauxites and alunites.

15. CAILLIERE, S.: The layered silicates of French bauxites. Estudios Geográficos, Vol.30. No.4-6. 1974. pp.603-604. /French/

Bauxite deposits in the Midi region, France, originate during karst processes. They are composed of pisolitic concretions rich in crystallized boehmite and /rarer/ diaspore and cemented by a gauge in which kaolinite, halloysite, pseudochlorite and a didioctahedral chlorite, sudoite, occur.

16. CAILLIERE, S.; POBEQUIN, T.: Light bauxites with dark pisolitic inclusions of the Pereille /Ariege/ region. Mineralogical Characteristics and Conditions of Genesis. Comptes Rendus Académie des Sciences de Paris, Ser.D. Vol.282 D, 12 Jul. 1976. pp. 123-125. /French/

The light bauxite with dark pisolites is characterized by a high alumina hydroxide content, mainly boehmite. Kaolinite is only present in a very low percentage; the Fe, of which there is very little, mainly ferrous Fe, is contained in the pisolites. These bauxites have been formed in a reducing zone intermediate between the red bauxites on the one hand and gray and black on the other.



17. GAILLERIE, S.; FOBEQUIN, T.: Different aspects of the Pereille /Ariege/ bauxites. Comptes Rendus Académie des Sciences de Paris, Ser. D. Vol. 278 D. 7. Jan. 1974. pp. 181-184. /French/

The numerous aspects of the bauxite deposits at Pereille /Ariege/ are discussed in their relation to the complexity of the mineralogical composition of this ore.

18. CALIOT, P.: World production and consumption of minerals in 1973. Annales des Mines, Dec. 1975. 134 pp. /French/

Bauxite is included among the important minerals studied. Comparative figures are given for 1968 and 1973, a forecast of future production tonnages /285 Mt bauxite for the year 2000 if the growth rate remains unchanged/, and the development of tonnages /1950, 1968 and 1973/.

Bauxite production or the equivalent in nepheline and alunite is tabulated for 23 producing countries.

19. CHAWLEY, H. et alii: Interlayered kaolinite-smectite in the Valdo-Fuvelien on the bauxite roof of the Alpilles /Provence/. Comptes Rendus Académie des Sciences de Paris. Vol. 283 D, 20 Sep. 1976. pp. 439-442. /French/

In the alluvial deposits of the Provencal Valdo-Fuvelien, the well-crystallized kaolinite derived from pseudobauxites passes progressively into the interstrata. Smectite forms the silts of the interstrata and invades the clay-bearing fraction of the sediments.

20. CHEILLETZ, A.: Inventory and map of ore deposits of Haiti. Science du Terre, Vol. 18. No. 4. 1973. pp. 381-407. /French/

A review. 44 ref.

21. CHILTON, L.V.: A guide to aluminium. The Aluminium Development Association Re-print. Series: No. 85. 19 pp.

Ores and production methods. Major fields of application of aluminium properties and methods of use of aluminium and its alloys.

22. CHOWDHURY, M.K.: Geology and mineral resources of the States of India. Pt. 3. Orissa. Geological Survey, India. Vol. 30. No. 3. 1974. pp. 1-51.

A review is presented with data on deposits of Fe, Mn, chromite, lateritic Ni ores, vanadiferous magnetite, Pb, Cu, Zn, bauxite, coal, clay, graphite and limestone.

23. CHOWDHURY, M.K.: Geology and mineral resources of the States of India. Pt. 2. Maharashtra. Geological Survey, India, Vol. 30. No. 2, 1974. pp. 1-35.

A review is presented with data on deposits of bauxite, coal, limestone, dolomite, Mn and others. Chemical analyses of ores are given.

24. COCHET, Y.R.: Origin of the bauxite deposits in the Padurea Craiului Mountains. In: Proc. II. International Symposium of ICSOBA. Budapest, Oct. 6-10. 1969. Budapest. 1971. Vol.2. pp. 63-68.

Res. Ins. Non-Ferrous Metals.

The author examines the origin of the bauxite deposits in the county Bihar, in the light of a new scientific theory. Preference is given to the allochthon theory, that is, the alluvialaeolian hypothesis which enwidens the methods of prospecting for bauxite.

25. ČUPINA, V. Ja.: Mineralogy of bauxites in Polar Urals. Trudy Zapadno-Sibirskogo Naučno-Issledovatel'skogo Geologorazvedskogo Neftjanogo Instituta. Vol.74. 1974. pp. 90-97. /Russian/

Geosynclinal bauxites in northwestern limbs of the Shuchinsk synclinorium are present in two horizons of the Middle Devonian section. The mineralogy of the Polar Ural bauxites was studied from samples taken in the Laborovsk area containing both horizons. All bauxites had boehmite-diaspore composition. The intensity of the endothermic effect at 150 to 180 C increased proportionally with increased SiO<sub>2</sub> content. The effect was probably caused by the presence of an amorphous opal substance.

26. DAVIS, C.E.: Recent advances in the understanding of the mineralogy of Jamaican bauxites. In: "Light Metals 1976". Vol.2. New York. 1976. Metallurgical Society, AIME. pp. 185-200.

The alumina trihydroxide mineral norstrandite occurs in association with its polytype gibbsite in amounts varying from trace to dominant in several Jamaican bauxites. Both X-ray and infrared data verify and suggest the possible occurrence of one or more other polytypes.

27. DELANGEON, P.: On the source of the bauxites of the Durancian isthmus. Comptes Rendus Académie des Sciences de Paris, Ser.D. Vol.280 D, 20 Jan. 1975. pp. 237-238. /French/

The study of the detrital ores of the bauxites of the Durancian isthmus provides an accurate basis for theories of the origin of the material giving rise to these aluminous rocks.

28. DRENOV, N.V. et alii: Presence of bauxite in the Siberian Platform. Doklady Akademii Nauk SSSR, Vol.220. No.5. 1975. pp. 1176-1179. /Russian/

Bauxites are associated with the karst forming Lower Paleozoic carbonatic rocks intruded by the Lower Triassic dolerites. The bauxites contain detrital gibbsite, goethite, quartz, corroded oolite and colloformic Fe hydroxides. The various types of bauxites are characterized by a high content of Al<sub>2</sub>O<sub>3</sub> /33,65-44,25/ and moderate amounts of Fe<sub>2</sub>O<sub>3</sub> /less than 40,77 wt %/. The gibbsite content is less than 35,0%. The origin of bauxite is discussed.

29. DUBOVSKAJA, V.M.: New data on the geology of bauxites, No.1. Moskva 1973, Vses. N-I Inst. Min.Syr'ya. 159 pp. /Book--Russian/

No abstract given.

30. DUDICS, E.: Bauxite deposits of Hungary. Geologija Rudnych Mestrozhenij. Vol.17. No.3. 1975. pp. 93-103. /Russian/

The Hungarian bauxite deposits are the karst type. They formed in Lower Cretaceous, Upper Cretaceous and Paleocene-Eocene stages. Argillaceous and higher grade varieties of bauxites are distinguished. They are primarily gibbsite and gibbsite-boehmite, containing diasporic 2% or less. Pure gibbsitic and boehmitic bauxites occur in separate beds. The bauxite ores are ferruginous with a low  $SiO_2$  content. The Hungarian bauxites formed as sedimentary products from the decomposition of lateritic weathering crusts and redeposition in karst depressions.

31. GALANHUERTOS, E.; MARTINVIVALDI, J.L.: Spanish kaolins. Geology, mineralogy and genesis. Pt.7. Hydrothermal Deposits. Boletin de la Sociedad Espanola de Ceramica y Vidrio, Vol.14. No.2. 1975. pp. 123-144. /Spanish/

Kaolin deposits at Lage, Jove, San Martin de Montalban, Golpejas and Otero de los Herreros were studied. The kaolins were formed from acid igneous and metamorphic rock at fractures, by hydrothermal action and by weathering to varying degrees. The Montalban deposit is post Cretaceous /Alpine/.

32. GEIDANS, L.: Bauxitic laterites of the South Western part of Western Australia. In: West.Aust.Conf.Australas. Inst.Min.Metall., Parkville, Aust. 1973. Australas. Inst.Min.Metall. pp. 173-182.

Tertiary laterite is extensively developed in the Darling Range area. Three laterite types are distinguished: transported /low level, detrital/, introduced /Bog Fe, lake laterite/ and residual /high level/. The last one has two types: residual A with decomposed bedrock as host material and residual B with alluvial and colluvial clays as host material. The thickest laterite development and thin or occasionally no laterite development were observed on slopes and crusts, respectively. Desilication of kaolinite in the latter is less due to a limited amount of water, small gradient, stagnant environment and lack of adequate drainage.

33. GIMPELSON, I.A.: Determination of the source of material removal during formation of bauxite-bearing deposits in South Timan /Method for statistical evaluation of series of relative mobility and association of trace elements/. In: Geologija Poleznyh. Iskop. Sev.-Vostoka Evr. Chasti SSSR Sev. Urala, Tr.Geol.Konf. Komi ASSR, 7th 1969. Syktyvkar, USSR. 1973. Akad. Nauk SSSR, Komi Fil. Vol.2. 1973. pp. 410-415. /Russian/

A series of relative mobility and element associations were determined

in layers of the bauxite zone, in unweathered sgrillaceous rocks, in their weathering core and in chlorite. The exhibition the Under-Secretary of State for Industry announced that the Spanish Government had just authorized the setting up of a complex comprising an alumina production works with a capacity of 800 000 tons/year and an electrolysis works with a capacity of 170 000 tons/year, at Sauciprian, in the north of the province of Lugo.

34. GRIGOREV, V.N.: Formation of primary gibbsite and boehmite in bauxites. In: Problemy Genezisa Boksitov. Moskva, 1975. Nauka. pp. 276-279. /Russian/

Young bauxite deposits, overlain by a thin layer of recent soil, in areas of recent laterite weathering /Jamaica, Haiti, Western Africa/ contain primary gibbsite under surface pressure and temperature conditions agreed well with thermodynamic calculations, for example, the preferable formation of gibbsite over boehmite and diaspore. The precipitation of boehmite requires neutral or weakly alkaline media in which the main form of monomer Al ion in solutions is  $Al/OH/4$ -anion.

35. GLADKOVSKY, A.K.: USHATINSKY, I.N.: Genesis and alteration of aluminous minerals in bauxites. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb 1-3 Oct. 1963. Zagreb. 1964. Acad.Yougoslave Sci.Arts. Vol.1. Zagreb, 1964. pp. 153-170.

Weathering of aluminous minerals under temperate climate conditions results in their hydration and silicatization; the final stage of the hydration is gibbsite and silicatization - kaolinite. Bauxite of any age and genesis can contain either all aluminous minerals or some or one of them. Quantitative correlations of the minerals depend on a degree of degradation of the bauxites and primary laterites.

36. GRUBIC, A.: The stratigraphic position of bauxites in the Yugoslav Dinarids. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb 1-3 Oct. 1963. Zagreb, 1964. Acad.Yougoslave Sci.Arts. Vol.1. Zagreb, 1964. pp. 51-79.

Triassic bauxites. Jurassic bauxites. Bauxites between the malm and the valentian. Lower cretaceous bauxites. Bauxites in the upper cretaceous. Bauxite between the upper cretaceous and the paleogene. Lutetian bauxite. "Bauxites" in the miocene. Bauxites of indeterminate age.

37. JURKOVIC, I.; SAKAC, K.: Stratigraphical, paragenetical and genetical characteristic of bauxites in Yugoslavia. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb 1-3 Oct. 1963. Zagreb. 1964. Acad.Yougoslave. Sci.Arts. pp. 253-263.

Accepting general classification of world's bauxite deposits into platform and geosynclinal ones, all bauxite deposits in Yugoslavia may be included into the geosynclinal type of bauxite.

38. LAMEY, C.A.: Metallic and industrial deposits. New York-St.Louis. 1966. Mo-Graw-Hill, Inc. 537 pp.

The book is organized in three parts, which deal respectively with /1/ the characteristic and origin of mineral deposits in general, /2/ the metallic deposits, and /3/ the industrial deposits. Part I is a discussion of the kinds of mineral deposits, their characteristics, localization, and origin. The formation of mineral deposits is considered under three principal categories: those formed by igneous activity, by metamorphic activity, and by surface agencies. Part II is a brief discussion of most of the more important metallic mineral deposits throughout the world and a summary of some features of production and reserves of various metals. Part III is a summary of the industrial deposits.

39. MAMEDOV, V.I.; GOBERMAN, R.G.: Characteristics of the behaviour of principal elements in the profile of sublaterite weathering crusts of Western Guinea. *Novye Danuye geologii Bokeitov*, Vol.2. 1975. pp. 148-157, 186-192.

A different geochemical environment is characteristic in the weathering crust of each lithological-mineral zone in the title region. In the zone of constant wetness, leaching predominates and removal of practically all of the chief elements is accompanied by transformation of the initial aluminosilicates into kaolinite. In the zone of fluctuating groundwater level hydrolytic decomposition of kaolinite takes place.

40. NICOLAS, J.; BILDGEN, P.: Evidence of a possible genetic relation between volcanism and the karstic bauxites. *Comptes Rendus Académie des Sciences de Paris*, Vol.282 D. No.19. 17 May 1976. pp. 1705-1707. /French/

In the South of France, the constant occurrence of trace elements of ferric nature in karstic bauxites results in the assumption that these derive from the weathering of volcanic rocks. A geographic and directional relation between bauxite ore and volcanic permo-triassic, then tertiary, outcrops known in the southern part of France /Provence/, is shown.

41. PATTERSON, S.H.; DYM, J.R.: Aluminium and bauxite. U.S. Geological Survey, Prof.Pap. No.820. 1973. pp. 35-43.

A review is presented on Al and bauxite geology, resources and research.

42. PEDAN, L.S.: First find of alunite in the mountain Crimea. *Doklady Akademii Nauk SSSR*, Vol.220. No.4. 1975. pp. 929-932. /Russian/

Alunite is described from regions of postvolcanic gaseous hydrothermal

activity. Alunite crystals occur in the insoluble residue of the Upper Jurassic limestones and are associated with opal, chalcedony, micro-quartz and goethite-hydrogoethite. Rhombohedral and hexagonal lamellar crystals are isometric with a pseudocubic habit.

43. PERINET, G. et alii: Mineralogy of the outcrops of pseudobauxites south of the Duranc. Comptes Rendus Académie des Sciences de Paris, Ser. D. Vol.278 D. 28 Jan. 1974. pp. 549-552.

Diffractometric analysis has confirmed, among other properties, the excellent crystallinity of the kaolinic fraction which is, in fact, better than that of the Var pseudobauxites. A theory of the genesis of the bauxites is advanced.

44. PETROV, N.P. et alii: Dairaksk bauxite deposits in Uzbekistan. Uzbeki Geologičeski Žurnal, Vol.18. No.6. 1974. pp. 59-63. /Russian/

Bauxite deposits in Uzbekistan occur in Triassic and Jurassic terrigenous - carbonatic and carbonatic sediments on the weathered surface of Permian basic effusive formations. The Upper Triassic bauxite-bearing horizon is formed by pelotomorphic bauxite rocks, which are, in upper levels, replaced by colitic fragmental bauxites and bauxite rocks. The mineralogical and chemical composition of these bauxites and bauxite rocks is given;  $Al_2O_3/SiO_2$  ratio is 1,75-6,9.

45. PETROVA, V.P.: The geology and mineralogy of bauxites. Moskva. 1964. Izdatelstvo Mir, 481 pp.

46. PUGIN, V.A.; SOLDATOV, I.A.: Melting of olivine nephelinite under P-T conditions. Geokhimiya, No.12. 1974. pp. 1825-1831. /Russian/

The melting and crystallization of olivine nephelinites, from the San Felix Island /Pacific Ocean/, were studied at high temperatures and pressures /less than 20 000 atm/. The nephelinite has normative olivine 13,07 nepheline 6,82, orthoclase 18,92, anorthite 22,81, acmite 18,01 and diopside 12,43%. The subsolidus region is characterized by the presence of clinopyroxenes, olivine, plagioclase, K feldspar and titanomagnetite. A genetic relation exists between alkaline olivine basalts and olivine nephelinites.

47. SAPOZHNIKOV, D.G.: On the subtraction of aluminium by organic acids from minerals and rocks in the course of weathering. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb 1-3 Oct. 1963. Zagreb. 1964. Acad.Yougoslave Sci.Arte. Vol.1. Zagreb, 1964. pp.107-113.

The experimental work carried out shows that organic acids help decomposition of minerals in the course of weathering. Alumosilicates lose alumina which is in its soluble form. The decomposition of minerals and alumina extraction are caused by acid solutions even of very low concentrations.

48. SEGALEN, P.: Aluminium in soils. Bondy, France. 1973. ORSTOM. 281 pp.  
Soil /material/. Compositions.

49. SHAFPER, J.W.: Bauxitic raw materials. Kaiser Explor. and Min.Co. In: Ind.Miner.Rocks, 4th Ed. 3. AIME, New York. 1975. pp. 443-462.

A review.

50. SINKOVEC, B.: Geological features and origin of the vrace bauxite deposit, Croatia. In: Proc.II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol.2. Res.Ins. Non-Ferrous Metals. pp. 30-52.

There are several bauxite deposits of Triassic age in the Lika region. Three bauxite horizons within kaolinite clays have been discovered in the Vrace deposit. The thickness of the bauxite horizons varies between two and four meters. The chief ore mineral is diasporite, then boehmite, while kaolinite and chlorite occur in subordinate amount.

51. SWARUP, P.: Mineralogy and origin of the Rajahmundry bauxite deposits, Uttar Pradesh, India, Geological Society of India, Vol.14. No.2. 1973. pp.169-177.

The mineralogy and origin of the laterite profile of the bauxite deposit was studied by X-ray diffraction. The laterite profile is subdivided as lowest, intermediate and upper zone according to chemical constituents and minerals. In bauxite, gibbsite is the chief mineral with subordinate boehmite, sometimes represents in situ residuum formed in a regular weathering profile with bauxite forming in the zone of aeration which is underlain by a cavernous laterite developed in a zone of water table fluctuation and basal lithomarge formed with the zone of saturation.

52. TAYLOR, G.R.; HUGHES, G.W.: Biogenesis of the Rennell bauxite. Economic Geology and the Bulletin of the Society of Economic Geologists, Vol.70. No.3. 1975. pp. 542-546.

Pyrite-rich clay sediments from a blackish-water lake on Rennell Island provide new evidence for bauxite genesis. The sediment represents an intermediate product and probably was produced by biogenic activity in a shallow-water environment. Several sources of possible parent material are considered. The bauxite deposit of northwest Rennell is derived from volcanic ash of hornblende andesite composition.

53. TODOROVA, T.; STEFANOV, D.: Mineral composition of bauxites, clays and terra rossa from the trun area. Izv.Geol.Inst.Bulg.Akad.Nauk., Ser. Stratigr. Litol., Vol.22. 1973. pp. 195-212. /Bulgarian/

The bauxites are of the karst type and comprise negative forms of the paleo-relief of the Tithonian limestones and dolomites. They are

covered by clays and other terrogenous sediments of the Turonian period. Their age is Lower Cretaceous.

54. TRASLIEV, S.; STEFANOV, D.: Mineral composition of the Awaso bauxites from Southwest Ghana. *Izv.Geol.Inst., Bulg.Akad.Nauk., Ser.Rudni Nerudni Polezni Izkopaemi*, Vol.23. 1974. pp. 223-233.

The Awaso bauxite is a lateritic deposit, developed on slightly metamorphosed pelites and graywackes from the upper part of the Lower Birrimian /Middle Precambrian/. From the top to the bottom, the following levels can be recognized: red, sandy loams, with fragments originating in the upper part of the bauxite crust; breccia of bauxite and strongly ferruginized fragments; hard, porous, yellow to red bauxites, sometimes with relicts of the primary texture of the original rocks.

55. VALETON, I.: Bauxites. Amsterdam-London. 1972. Elsevier Publishing Co. 226 pp.

Definitions of bauxite, alumina and aluminium. Economic importance of bauxite deposits. Weathering and neomineralization. Classification of bauxites. Description of types of deposits. Geochemistry of bauxite deposits. Problems awaiting solution.

56. VALETON, I.: Developments in soil science, Vol.1. Bauxites. Amsterdam, 1972. Elsevier. 234 pp.

57. Weathering of Yucatan limestones. The Genesis of Terra Rosas. W.C. Isphording. Durham, N.C. 1974. University of South Alabama Mobile and Army Research Office. 18 pp.

The Yucatan Peninsula is the largest area of exposed carbonate rocks in the Caribbean region and provides an ideal site to study the weathering of limestones and dolomites under tropical conditions. The Yucatan Peninsula has a wide variety of rainfall, topography and vegetative cover, and limestones that are similar in mineralogy and weathering history to those in Jamaica. This paper discusses the genesis of Terra Rosa soils in Yucatan, and relates this to the broader problem of bauxite genesis by weathering of parent carbonate rocks.

58. YUNG, A.H.: Presence of aluminium-rich soils in the Southern zone of Chile /Bio-Bio, Ilanquihue/. *Revista de Geologia, /Chile/, No.2. 1975.* pp. 34-40. /Spanish/

Red clay soils and volcanic type soils occur in the provinces. They contain 22-26  $Al_2O_3$  and 10-13%  $Fe_2O_3$ . The red clay soil contains 1,5%  $TiO_2$ .



## 2. PROSPECTING METHODS OF BAUXITE. EVALUATION OF DEPOSITS

59. ALEVA, G.J.J.: The bauxites of the Guyana shield as a source for refractory grade raw materials. *Interceram*, Vol.24. No.4. 1975. pp. 259-261.

The geology of the bauxite deposits of Guyana and Suriname is given and some individual deposits described. Some of the deposits contain considerable amounts of low-Fe bauxite suitable for the chemical, abrasive and refractory materials industries. Beneficiation was necessary in some deposits and not each deposit could produce the whole range of grades commercially required.

60. AL FAR, D.M.: Field test for bauxites and related ores. *Annals Geol.Surv. Egypt.*, No.1. 1971. pp. 147-149.

Free  $Al_2O_3$  can be detected by grinding the sample with an equal weight of  $NH_4Cl$  and heating in a test tube; the presence of more than 0.1% free  $Al_2O_3$  can be detected by the evolution of  $NH_3$ . If carbonate is present, the sample must first be treated with excess  $HCl$ , then dried. If iron oxides are present, they are first reduced to Fe by heating with excess charcoal and the Fe is removed with a magnet.

61. Alunite deposits in the Dogcheon area. Byeong-Cheol Park. *Chijil Kwangmul Chosa Yongu Poloso*, Vol.2. No.2. pp. 141-153. /Korean/

Alunite occurs in rhyolitic rocks. Reserves are estimated to be 5,77 million tons containing  $Al_2O_3$  24,6,  $SO_3$  14,0,  $K_2O$  3,9%; the high-grade zone contains 0,59 million tons containing  $Al_2O_3$  28,9,  $SO_3$  20,1,  $K_2O$  6,19%. Many analyses are given.

62. BARONE, R.: Analytic profile of cyanite. Rio de Janeiro, Brazil. 1973. 5 pp. *Ministerio das Minas e Energia, Departamento Nacional da Producao Mineral, Bulletin No.7.* /Pamphlet Portuguese/

Information international in scope concerning cyanite was compiled to assist the Brazilian government in setting policy with respect to the mineral substance and provide private business with data on which to base investment decisions. Geology, technology, applications, production, consumption, trade, prices, the utilization of associated minerals and miscellaneous other topics are covered by means of text, tables, charts, maps, statistics and flow sheets. Specifics of the Brazilian scene include locations of mines and deposits, volume of reserves, domestic taxes and import duties. 27 ref. S.A.

63. BATALIN, Ju.V.: Dawsonite prospecting in the USSR. VNIIGeolnerud, 21 pp. /English/

Data are presented as to the possibility of discovering large dawsonite desposits of industrial value in the USSR. The various regions with dawsonite are discussed in detail as well as the nature of the mineral deposits. The mineralogy of dawsonite is covered in some detail. 28 ref.

64. BENESLAVSKY, S.I.: Some characteristics of the mineral composition of Turkish bauxites. Trudy VAMI, No.81. 1971. pp. 51-14. /Russian/

The geological and chemical characteristics of bauxite deposits in western Turkey are described. These deposits may be divided into the following mineral classes: boehmite, boehmite-diaspore and diaspore-corundum. The  $Al_2O_3$  content of these ores ranges from 38-70%, and the  $SiO_2$  content ranges from 0,3-20%. The leaching characteristics of the ores from different Turkish deposits are presented.

65. BRONEVOJ, V.A. et alii: Genetic relations of Gibbsite and kaolinite in laterite covers of West Africa. Doklady Akademii Nauk SSSR, Vol.224. No.2. 1975. pp. 422-425. /Russian/.

The mineralogical zoning of the weathering crust in the Boke and Kindia regions /Guinea/ is closely related to the present hydrogeological regime. Under acidic conditions gibbsite formation is practically impossible. Gibbsite is unstable in the weathering crust and kaolinite should predominate, that is, resilification of earlier-formed eluvial gibbsitic bauxites is presently taking place. This explains the presence on the present-day surface of a lateritic, essentially siliceous covering formation.

66. CARTER, G.S.; BENNETT, J.D.: Geology and mineral resources of Malawi. Geological Survey Department Bulletin, /Malawi/, No.6. 1973. pp. 1-62.

A review is presented including descriptions of deposits of phosphates, bauxite, clay, coal, kyanite, limestone, monazite, Nb, strontianite, U and others. 82 ref. CA.

67. CHOWDHURY, M.K.R.: Prospection of indian bauxite and reserve estimation. In: Proc. IV. International Symposium of ICSOBA. Vol.2. Budapest, Oct. 6-10. 1969. Budapest. 1971. Res.Ins. Non-Ferrous Metals. pp. 21-29.

Suggestions have been made to standardise the collection of data and adoption of prospecting techniques on definite pattern for calculating ore reserves under categories "Proved", "Probable", "Possible" and "Potantial?"

68. CLARKE, O.M.: Bauxite and kaolin in the eufula bauxite district, Alabama. Alabama, Geological Survey Bulletin. No.100. 1972. pp. 1-90.

Deposits in the area range in size from a few tons to over 100 000 tons. In general, bauxite /predominantly gibbsite/ is surrounded by kaolinitic clay. Chemical and spectrographical analyses are given of bauxites, kaolin clays and limestones.

69. DUDICH, E.; KÁROLY, Gy.: Subsurface geologic maps in Hungarian bauxite prospecting. motives and principles. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Vol.1. Zagreb, 1-3. Oct. 1963. Zagreb. 1964. Acad.Yougoslave Sci.Arts. pp. 235-249.

The practically complete printed and the available unpublished geologic literature, the topographic and geologic maps of the concerned regions were compiled. The data of several thousand bore holes were collected, registered critically compared, selected, and systematically stored.

70. PABBI, A.; RABBI, E.: The bauxite of Monte Turchio /Abruzzi National Park/. Giornale di Geologia, Vol.39. No.1. 1971. pp. 29-60. /Italian/

The bauxite deposit is described, with 42 chemical analyses.  $Al_2O_3$  content is 30,0-58,3,  $Fe_2O_3 + FeO$  8,0-34,8,  $SiO_2$  1,7-26,3%. The deposits were formed by the weathering of limestone.

71. FEDORSTOV, V.A.: et alii: Novopavlovskoe ore manifestation of bauxites. Geologičeskij Žurnal, Vol.34. No.4. 1974. pp. 138-139. /Russian/

Bauxites and bauxite-like rocks of the Novopavlovskoe deposit /Ukrainian Shield/ are studied. The rocks are poorly crystallized, gelformed material containing gibbsite, kaolinite and chamosite. Quartz, plagioclase, siderite, calcite and sulfides are present in variable amounts. The rocks were studied by X-ray analysis, DTA and chemical analysis. The bauxites contain  $Al_2O_3$  21,94-44,75 and  $SiO_2$  12,96-46,6, and Ti over 1%. The relatively low Al content and considerable amount of terrigenous materials cause the ores to be unfavorable for industrial use. Mechanism of the deposit formation is suggested.

72. GOROVOI, A.P.; MYRKOV, A.A.: Geosynclinal bauxites of Cambodia. Mineral. Osad.Obras., No.1. 1974. pp. 128-131. /Russian/

The bauxite region is located in northwestern Cambodia in the Battambang province. Two reddish bauxite beds with thickness less than 3 m were found in hillock-forming Upper Paleozoic limestones of the region. The bauxitic rocks are alitic. Boehmite and chamosite were identified in samples from one locality and diaspore and hematite were identified in those from another locality. Chemical analyses of the rocks are tabulated and the trace element content detected by spectral analysis is given.

73. GRAINGER, D.J.; GRAINGER, R.H.: Explanatory notes on the 1:2 500 000 mineral deposits map of Papua, New Guinea. Australian Bureau of Mineral Resources Geological Geophys. Bulletin, No.148, 1974. pp. 1-171.

A tabulation of occurrences of mineral deposits is given. Major Cu mines are in production. Deposits of Au, Fe, lateritic Ni, bauxite, natural gas and others are listed.

74. GROSSI, A.W.R.: Search for and mining of bauxite. Geol.Metal., Bol., No.35. 1974. pp. 49-58. /Portuguese/

A review is presented on the exploration and mining of Brazilian bauxite.

75. HUSTED, J.E.: Potential reserves of domestic non-bauxitic sources of aluminium. New York, N.Y. 1974. Vol.21. Metallurgical Society of AIME, 21 pp. TMS Paper No. A74-65.

A study concerning domestic Al reserves was made for the U.S. Dept. of the Interior, Bureau of Mines. Some of the clays of the Appalachian, mid-western and other areas were shown to have substantial tonnages of alumina. These clays, despite large tonnages, are marginal resources at best. Information was gathered between 1972-1973 by field visits to deposits, by visits to state geological surveys, from industry sources and from the literature.

76. LIJIMA, A. et alii: Relationship between mineral composition and grain-size distribution in the low-grade bauxite deposit on Bintan Island. In: ICSOBA Third International Congress, Nice, 1973. pp. 55-61.

Grain-size distribution, mineral composition in each of size fractions, and shapes and textures of bauxite concretions in Bintan bauxite deposits in the "areas of low-grade ores" were investigated. The top of the deposits contains abraded fragments of laterite and bauxite, and it has a skew size distribution like crushed ores. Bauxitization and silicification have been repeated in the top and overburden of the deposits.

77. LUKOVIC, S.: Some observations on the mineralogy and petrology of the bauxite deposits of Montenegro, Yugoslavia, In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Zagreb, 1-3. Oct. 1963. Zagreb. 1964. Acad. Yougoslave. Sci.Arts. pp. 275-284.

Besides very clean, dense bauxites in some parts of the deposit there are bauxites enriched with silica, iron, manganese, and calcium, then, oolitic and pisolitic bauxites grading locally into iron ores, next, leached or pyritized bauxites, bauxitic clays, and drifted in deposits karst loams and finer or coarser detritus.

78. MACK, E.; PETRASCHECK, W.E.: Exploration and evaluations of sealed bauxite deposits. In: Proc. II. International Symposium of ICSOBA. Vol.1. Budapest, Oct.6-10. Budapest, 1971. Res.Ins. Non-Ferrous Metals. pp. 37-41.

Sealed bauxite deposits of the karst type are sometimes indicated at the surface by morphologic depressions which have been formed by sub-solution and collapse of the roof above the bauxite lenses. On the contrary, bauxite deposits produced by tropical weathering of silicate rocks are commonly to be found on the top of morphologic elevations.

79. Alunite deposits in the dogcheon area. Byeong-Cheol Park. Chijil Kwang-mul Chosa Yongu Poloso, Vol.2. No.2. 1974. pp. 141-153. /Korean/

Alunite occurs in rhyolitic rocks. Reserves are estimated to be 5,77 million tons containing  $Al_2O_3$  24,6,  $SO_3$  14,0,  $K_2O$  3,9%; the high-grade zone contains 0,59 million tons containing  $Al_2O_3$  28,9,  $SO_3$  20,1,  $K_2O$  6,19%. Many analyses are given

80. MAMADEV, V.I.; GOBERMAN, R.G.: Geology and bauxite content in the fore-ariah-farmoria region /Western Guinea/. Novye Dannye Geologii Boksitov, No.2. 1975. pp. 165-173, 186-192. /Russian/

The Farmoria deposit is confined to residual hills in laterite covers 7-25 m thick developed on amphibolite bedrock. The largest amounts of bauxite are confined to the lower part of the zone of aeration and spatially coincide with the zone of periodic enrichment of the subsurface weathering crust atmosphere by  $CO_2$ . The Farmoria deposit has reserves of  $3,3 \times 10^6$  metric tons with content  $Al_2O_3$  38,  $SiO_2$  12,5, and  $Fe_2O_3$  21,5%.

81. MIHAJLOV, B.M.: Concerning the degree of reliability of the forecast of bauxite content of the USSR presented on a map with a 1: 2 500 000 scale. Sovetskaja Geologija, No.12. 1975. pp. 112-118. /Russian/

The map, completed in 1971, is evaluated as to its usefulness for locating areas for bauxite exploration in the USSR. Reasons accepted for analysis of bauxite content and the ore potential of large areas are: the affiliation of formations with a definite epoch of bauxite accumulation and concretion genesis, the facies and structure setting of the formations and the composition and structure of the basement of the bauxite-bearing formations. Bauxite provinces are subdivided into three groups.

82. MINNES, D.G.: Nepheline syenite. In: Industrial Minerals and Rocks, New York, 1975. AIME pp. 861-894.

A review is given of geological exploration, evaluation of deposits, marketing and future growth prospects of nepheline syenite.

83. MURARI, K.: Management of bauxite mines in India. Journal of the Institution of Engineers, Mining and Metallurgy, Division, India. Vol.55. No. MM2-3, Mar. 1975. pp. 55-58.

In India, bauxite occurs largely in patch deposits. The patches are small and bauxite-bearing areas are leased out to small private owners. The ownership of only a few mines rests with the State or the Central Government. Management of the different types and sizes of such mines is different. A study of profitability of mines and the required organizational structure is presented.

84. MURARI, K.: Quality control in mechanised bauxite mines in India. In: Proc. II. International Symposium of ICSOBA, Vol.2. Budapest, Oct.6-10. 1969. Budapest, 1971. Res.Ins. Non-Ferrous Metals. pp. 263-272.

After a brief description of the geology of the bauxite deposits and their types of location in India, the development of the bauxite production since 1952, the prospecting for bauxite, and its exploitation and quality control is being discussed.

85. NICOLAS, J.; OZLU, N.: Contribution to the study of the Kiziltas bauxite deposit in the Western Taurides /Central Turkey/. Comptes Rendus Akademie des Sciences de Paris, Vol. 282D. No.13. 29.Mar. 1976. pp. 1253-1255.

Petrochemical, mineralogical and geochemical study of the Kiziltas bauxite deposit showing the sedimentary character of this formation. This implies its allochtony in relation to the limestones underlying the bauxite.

86. PATTERSON, S.H.; DYNI, J.R.: Aluminium and bauxite. In: "U.S. Mineral Resources", Washington, D.C. 1973. Geological Survey, pp. 35-43.

Imports of bauxite and alumina supply approximately 87% of the U.S. requirements for manufacture of Al metal and certain refractories, abrasives and chemicals. Bauxite mined in Arkansas, Georgia and Alabama supplies the remaining 13%. The growing requirements of the Al industry will be met by imports of increasing amounts of Al metal and alumina rather than bauxite ore. Domestic sources of bauxite are inadequate to fulfill long-term demands; however, virtually inexhaustible potential alternate sources. Dawsonite in rich oil shale deposits and alunite may be possible Al sources. Less promising potential resources include aluminous shale and slate, Al phosphate rock, igneous rocks, saprolite, coal ash and Cu leach solutions.

87. PEARL, R.M.: Handbook for prospectors. New York-St.Louis. etc., 1973. McGraw-Hill Book Co. 472 pp.

Although this book deals with the whole globe, as befits a handbook, emphasis has properly been placed on prospecting in the United States, Canada, Mexico, Australia, and the other countries in which prospec-

ting in the United States, Canada, Mexico, Australia, and the other countries in which prospecting and mineral collecting are encouraged or at least permitted and where they can be done on a basis that is reasonably congenial to the individual who is familiar with the mining customs and laws of a free-enterprise system.

88. PEVRONNET, Ph.; ROCH, E.: Argillites and bauxite of Provence /France/. *Revue de Geographie Physique et de Geologie Dynamique*, Vol.16. No.3. 1974. pp. 313-326.

The bauxite ores of southeastern France are associated with argillites-hyperaluminous and ferruginous rocks with quartz and  $Al(OH)_3$ . These constituents are not due to the deterioration of bauxite, but constitute a stage between argillaceous and ferruginous alterations. The massifs never contained laterite.

89. PISKUNOV, B.N.: Types of high-alumina basaltic rocks and their distribution in the structure of the Kurile Island arc. *Doklady Akademii Nauk SSSR*, Vol.220. No.5. 1975. pp. 1172-1175. /Russian/

High- $Al_2O_3$  /over 17%/ basaltic rocks, belonging to the tholeiitic alkali olivine basalt trends, are widespread in the Kurile Island arc. Basalts of the Glavnoe zone are characterized by the presence of normative quartz and orthopyroxene; basalts of the Zapadnoe zone contain olivine and nepheline. The spatial distribution of the different types of high- $Al_2O_3$  basaltic rocks is discussed in relation to their compositions.

90. The question of Spanish bauxites. *Journal du Four Electrique*, No.10. Dec. 1975. pp. 232.

The question of the existence of commercially workable deposits of bauxite in the northeast region of Spain, no other being suitable geologically, arose before the 1936-1939 Civil War. Various studies and investigations so far have offered only a partial solution. Three bauxite-bearing zones are worth considering: the region of the south Pyrenees in the province of Lerida, where for the past 40 years there have been known deposits of the order of 1,2 Mt, possibly twice this amount, with 41 to 61%  $Al_2O_3$ ; a central zone, comprising part of the provinces of Barcelona and Tarragone, with 320 000 to 700 000 tons having a 51-68%  $Al_2O_3$  content in some isolated areas; and the province of Teruel, 600 000 tons containing 36-58%  $Al_2O_3$ , and with a probable or possible 1,2 Mt.

91. ROUGERON, R.: Bituminous schists looking for users. *Industries et Techniques*, No.298. 10.Oct. 1975. p. 89, 91, 92, 95-96. /French/

World reserves of bituminous schists are considered, in particular,

French deposits. Apart from their interest from the point of view of energy for oil production and combustion, the schists contain alumina, in some deposits to the extent of 25%. In modern processes, such as the Pechiney Ugué Kuhlmann H<sup>+</sup> process, they can be used for the extraction of alumina and so are of interest because of the increasingly high price of bauxite and the dwindling reserves of this material.

92. ROULLIER, J.P.: Bauxite. Revue de l'Aluminium, No.426. Febr. 1974. pp.81-88.

The current situation regarding the world exploitation of bauxite is presented in the form of a general technical and economic study. A table shows the compositions of the principal bauxites used according to origin: Jamaica, Guinea, France, Australia. Figures are given for known world reserves. A more detailed study of the French deposit follows and finally, after a study of the technical conditions of exploitation, the future development of world bauxite extraction is considered.

93. SZABÓ, M.W.: Field guide to mineral deposits in South Alabama. Geological Survey, Circ.Alabama, No.90. 1973. pp. 1-38.

Descriptions are given of deposits of bauxite, Fe ore, lignite and limestone.

94. SZUBERT, E.; VERGARA, V.D.: Bauxite from Lages, Santa Catarina, Brazil geology and availability. Min., Metal., Vol.31. No.373. 1976. pp. 18-23. /Portuguese/

The bauxite deposits at the northern flank of the Lages area were studied. The reserves of 14 305 000 metric tons of bauxitic material within 228,88 hectares of bauxitic and argilo-bauxitic ore averaged Al<sub>2</sub>O<sub>3</sub> 33,3, Fe<sub>2</sub>O<sub>3</sub> 28,0 and SiO<sub>2</sub> 3,4%. The Al<sub>2</sub>O<sub>3</sub> level is considered low for industrial exploitation but high for alteration products of basic rock.

95. TAKEDA, H.: CENNR and mineral resources in Mexico. Chishitsu Nyusu, Vol. 242. 1974. pp. 37-45. /Japanese/

A description was given of the CENNR /Council for Nonrenewable Natural Resources/ and its investigations of Mexico's deposits of Fe, coal, Cu, Ag, Sn, bauxite S, alkaline chlorides, P and Au. Mexico's petroleum, natural gas and nuclear fuel resources were also described.

96. TOIUN, R.: Possibilities for the evaluation of Turkish alunites. In: "CENTRO Symp.Min.Benefic.Fert.Mineral., Proc.", Cent. Treaty Organ., Ankara, Turkey. 1974. Public Relat.Div., pp. 286-291.

Reserves of alunite are more than 37 million tons and contain K<sub>2</sub>O



2,6-4,2%. Possible methods of treatment are discussed. Mother liquor residues from evaporation of sea water amount to one million tons containing KCl 2,18%.

97. VANLISSA, R.V.: Review of bauxite exploration in the coastal plain of Suriname. Geol. Mijnbouwk: Dienst Suriname, Meded., Vol.23. 1975. pp. 250-254.

A summary is given of past work on bauxite prospecting and suggestions are made for further study.

98. WALKER, W.W.; STEVENS, D.M.: The Earth Sciences-National-Southwire alunite-to-alumina project. New York, N.Y. 1974. Metallurgical Society of AIME, 6 pp. TMS Paper No. A74-64.

Since 1971, a joint venture involving National Steel Corp., Southwire Co. and Earth Sciences, Inc. has been evaluating a major alunite deposit in southwestern Utah as a source of alumina and fertilizer by-products. The deposit was discovered by Earth Sciences in 1970. Over 55 000 ft of drilling have proven up more than 100 million tons of material containing 35-40% alunite. An additional 600 million tons of comparable grade are designated as indicated and inferred reserves. Metallurgical research has resulted in a process which yields cell-grade alumina and fertilizer byproducts from alunite.

3. ANALYSIS AND TESTING; CHEMICAL, PHYSICAL, MINERALOGICAL, TECHNOLOGICAL

99. ABUBAKIROV, S.A. et alii: Removal of iron from aluminium chloride solutions extraction. In: Tehnologija Minerlnogo Syrja, Alma-Ata, USSR, 1972. Kaz. N-I Inst. Miner. pp. 208-213.

The Fe /III/ concentration in acid  $AlCl_3$  solutions /obtained by leaching of clays and containing 90-120 g/l Al as  $Al_2O_3$ / was reduced from 2-4 to less than 0,1 g/l by extraction with a mixture of  $C_7$ - $C_8$  monocarboxylic fatty acids at an aqueous/organic volume ratio of 15/1. The optimum initial pH for the aqueous solution was 1,5 - 1,8. Increasing the temperature from 13-60°C reduced the degree of extraction of Fe. About 1-2% of the Al was extracted into the organic phase.

100. Aluminium and vanadium extraction from goethite contained in bauxite by treatment with calcium oxide and sodium chloride. Alutervy Aluminiumipari Tervező Vállalat and Fémipari Kutató Intézet, No. 2 335 732, /14.Jul. 1972/ German Patent.

$Al_2O_3$  and  $V_2O_5$  contained in the goethite fraction of bauxite is extracted by converting goethite to hematite at 220-280, preferably 240-250°C with an aluminate liquor having the concentration 100-300, preferably 200-250 g/l  $Na_2O_3$  /the Na content of the solution in the form of Na Oh bound to Al/, and in the presence of 1-6 wt % CaO and 0,5-12, preferably 2-4 wt % NaCl, referred to the dry weight of bauxite.

101. BADIA, D.; NICOLAS, J.: Study by infrared spectroscopy of the process of kaolinization by bauxite resilification in certain areas of the Val synolinal /Var/. Comptes Rendus Académie des Sciences de Paris, Ser.D., Vol. 280D, No.16, Apr.28, 1975. pp. 1845-1852 /French/

In certain sectors of the Val synolinal /Var, France/ the bauxite is kaolinized by the action of percolating water rich in silica. A study of this phenomenon by infrared spectroscopy shows that kaolinization is preceded by a progressive degradation of well-crystallized boehmite which is transformed by way of a quasi-boehmite to a pseudoboehmite and finally an alumina gel.

102. BANERJEE, P.K.: Reconnaissance survey of the distribution of some trace elements in Indian bauxite. Mineralium Deposita, Vol.10. No.2. 1975. pp. 177-188.

Spectrographic analyses show that the distribution of Cr, V, Zr and

Ga is randomized with the model of complex polycyclic sequence of bauxite genesis of previous studies. Bauxite deposits over khondalites and charnockites have lower concentrations of Cr, V and Zr.

103. BÁRDOSY, Gy.: The complex methods developed in Hungary for the mineralogical-petrological and geochemical evaluation of bauxites. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18-21, 1972. Leningrad. - Budapest, 1975. VAMI-KFKI, pp. 27-42.

Systematic research for the past years led to the development of a complex method providing comprehensive information both to the geologists exploring bauxite deposits and to the technologists processing bauxite. Bauxite grading is based on the complex interpretation of results obtained by the following methods:

Determination of texture and particle size

Determination of other petrological characteristics

Quantitative determination of mineralogical composition

104. BÁRDOSY, Gy. et alii: Quantitative phase analysis and texture of typical Hungarian and Soviet bauxite samples. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18-21, 1972. Leningrad. - Budapest, 1975. VAMI-KFKI, pp. 43 to 141.

The methods used for studying these bauxites were: texture and particle size. Macroscopic description of the rock, microsection studies, electron probe microanalysis. Other petrological characteristics: colour of the bauxite samples, fracture of the bauxite samples, feel of the bauxite samples. Porosity and type of space filling. Quantitative determination of the mineralogical composition. X-ray diffractometry. Derivatography. Microsection studies. Infrared absorption spectrophotometry. Micromineralogical tests. Technological tests etc.

105. BENESLAVSKIJ, S.I.; BESSONOVA, A.S.: Features of the composition of bauxites in Ukhtinsk influencing selection of their processing technology. In: Geol.Polez.Iskop.Sev. - Vostoka Evr. Chasti SSSR Sev. Urala Tr.Geol.Konf.Komi ASSR 7th 1969, 1971. No.1. pp.78-83.

The composition of Ukhtinsk bauxites was studied and methods for treating them were studied. Both chemical and mineralogical composition differed greatly for individual deposits. The methods used for obtaining  $Al_2O_3$  concentrates were: Sintering with soda and limestone in different ratios, leaching at 105 and 190 C by the Bayer method and thermohydrochemical removal of  $SiO_2$ .

106. BENESLAVSKY, S.I.: Forms of collaboration of VAMI with geological organisations in evaluation of deposits and with alumina plants in control of bauxites quality /some results of investigations/. In: Mineralogical and technological evaluation of bauxites. Proceedings of the

second conference of VAMI and KFKI, Jan. 18-21, 1972. Leningrad - Budapest, 1975. VAMI-KFKI, pp. 13-26.

The study of mineralogical composition of bauxites in VAMI is mainly limited by investigations of bauxite behaviour in conditions of processing. Major attention is paid to causes of divergence of actual recovery of  $Al_2O_3$  at alumina plants and theoretically possible clarification of solutions upon settlement of muds.

The cause of incomplete recovery of  $Al_2O_3$  from diaspore bauxites in the presence in their composition of vein diaspore. In recent years owing to discovery of new deposits in the USSR and purchases of bauxites abroad were found new facts in the above directions.

107. BENESLAVSKY, S.I. et alii: Study of some causes of different digestibility of bauxites. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18-21, 1972. Leningrad - Budapest, 1975. VAMI-KFKI, pp. 163-166.

It was established that digestibility of bauxites, first of all, depends on structural characteristics of the rock-forming minerals. Degree of alumina extraction from bauxites considerably depends on the strength of hydrogen bond in aluminium hydroxide and on the presence of kaolinite of specific form which causes looseness in the lattice of the rock-forming minerals.

108. BERNARD, et alii: Determination of 180/160 isotope relations of gibbsite and boehmite in different bauxites. Comptes Rendus, Académie des Sciences de Paris, Sér.D, Vol. 282D, No.11, 15.Mar., 1976. pp. 1089-1092.

By using oxygen isotopes it is possible to differentiate among the main forms of aluminium-hydroxide formations as the gibbsite and boehmite. Primary and secondary gibbsite seem isotopically identical, supposing an equilibrium of the two formations with waters of the same isotopic composition, under very closely related temperature conditions.

109. BEZJAK, A.; JELENIC, I.: The crystal structures of boehmite and bayerite. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium. Vol.2. Zagreb 1-3 Oct. 1963. Zagreb, 1964. Acad.Yougoslave.Sci.Arts. pp.105-112.

By analysing the observed intensities of all the reflections it has been proved that bayerite has a pseudo-hexagonal arrangement.

110. BIAIS, R. et alii: Contributions to the Study of Fe-Al substitutions in laterite rocks as well as in the hydroxides and oxides formed. In: ICSOBA Third International Congress, Nice, 1973. pp. 295-306. /French/

Various samples of laterites were studied by X-ray diffraction, electron microscopy and Mossbauer spectroscopy to characterize the composite hydroxides and oxides of Al and Fe: aluminous goethite and hematite,

hematite corundum solid solutions, Fe-bearing corundum, etc. The Fe-Al phases found in laterites were synthesized by hydrothermal treatments. An Fe-bearing diasporite was also formed at a relatively low temperature. The insolubility of some of the alumina in the Bayer processing of laterites is attributed to the Fe-Al substitutions.

111. BLJUMENTSEN, A. et alii: Selection of the rational complex of nuclear geophysical methods for borehole logging at bauxite deposits. In: "Razved Geofiz. SSSR Rubeze 70, Godov, Mater. Vses. N-T Geofiz.Konf., 7th" 1972. Moskva, 1974. Nedra, pp. 335-339.

Neutron activation logging /NAL/, selective gamma-gamma logging and neutron logging is suggested as a composite method for prospecting and exploration of bauxite deposits. Use of the method in logging laterite bauxites of the Kursk Magnetic Anomaly produced lithological subdivision of the section, distinguished the bauxites, determined the content of  $Al_2O_3$ ,  $SiO_2$  and oxides of Fe and Ti and estimated the density of the ores.

112. BOGAČEVA, L.M. et alii: Reaction of components of alumina-containing raw material with nitric acid at 200°C. In: Kislotažna Pererabotka Aluminisoderž, Syrja na Glinozem 1974, pp. 10-16. /Russian/

113. BOIDAČENK, V.M.; PJATA, S.Ja.: Use of a gamma method for the study of borehole profiles of bauxites in the Belgorod region of the Voronezh anteolise. Mater.Geologii Poleznych Iskopamyh Cnetralnyh Rajonov Evropejskoj Casti SSSR, 1970. No.7, pp. 122-125. /Russian/

A close correlation was found between the intensity of the natural gamma-radiation and the content of  $Al_2O_3$  and  $SiO_2$  in two borehole profiles of the Belgorod Fe ore region. No correlation was found between the electrical resistance and the content of  $Al_2O_3$  or  $SiO_2$  in the profiles.

114. BOLOSIN, N.N. et alii: Averaging bauxites. Obogasčenie Rud, Vol.19, No.4, 1974. p.13.

Fluctuations are shown of the quality indicators of raw materials and conversion products and their effect on the production process is examined. Analysis of the correlation coefficients among bauxite quality indicators established that the  $Al_2O_3$  content is linked negative to those of  $SiO_2$  and  $Fe_2O_3$  at correlation coefficient values of 0,30 for  $SiO_2$  and 0,5-0,6 for  $Fe_2O_3$ .

115. BOLOSIN, I.N. et alii: Neutralization of bauxites. In: Obogasčenie Rud, Vol.19, No.4, 1974. pp. 11-15. /Russian/

Fluctuations are shown of the quality indicators of raw materials and conversion products and their effect on the production process is

examined. Analysis of the correlation coefficients among bauxite quality indicators established that the  $Al_2O_3$  content is linked negative to those of  $SiO_2$  and  $Fe_2O_3$  at correlation coefficient values of 0,30 for  $SiO_2$  and 0,5-0,6 for  $Fe_2O_3$ .

116. BOTINELLY, Th.: A review fo the minerals of the alunitejarosite, beudantite and plumbogummite groups. In: Journal of Research of the US. Geological Survey, Vol.4, No.2. 1976. pp. 213-216.

Minerals of the alumite-jarosite, beudantite and plumbogummite groups can be divided on the basis of Fe or Al content into two groups which are consistent in optical and X-ray characteristics. Both chemical and X-ray data are needed for identification.

117. BRIN, V.G.; EREMIN, N.I.: Tr.Vses. N-I Proekt.Inst.Alyum.Magn.Elektrod. Prom., No.81, 1972. pp. 32-39. /Russian/

Thermodynamic analysis of chlorination of Fe and Ti oxides at 800 to 1300 K without a reducing agent showed only an insignificant degree of conversion of the chlorinating agent. Complete consumption of the chlorinating agent was possible only by recirculation. The degree of iron oxide chlorination with Cl increased with temperature increase.

118. CIOLA, R. et alii: Variation of the specific area, surface acidity and pore volume of Brazilian bauxites as a function of the treatment temperature. In: Annales Association Brasil Quimique, Vol.28, No. 1/2, 1972. pp. 199-216. /Portuguese/

Ten samples of Brazilian bauxites /all of the  $Al(OH)_3$  type/ were examined to determine the temperatures producing maximum specific area, maximum number of acid sites/gram and per sq.cm, and maximum pore volume. They have good surface characteristics and are equivalent to foreign products for industrial applications, such as catalysts.

119. DALY, B.K.; BINNIE, H.J.: Leaching method for the extraction of acid oxalate-soluble aluminium and iron from soil in conjunction with cation exchange leaching. Communications of Soil Science Plant and Analysis. Vol5, No.6, 1974. pp. 507-514.

A method is described for the extraction of acid oxalate-soluble Al and Fe from soil by leaching with oxalate reagent following the leachings for cation-exchange properties. The method is faster and more convenient than the shaking method of Tamm and gives comparable results.

120. DAVIS, C.E.: The mineralogy of Jamaican bauxites. In: Journal of Geological Society, Jamaica, 1973. Special Issue, pp. 6-20.

Gibbsite, boehmite, nordstrandite, goethite /in part Al/, and hematite are the principal minerals. X-ray powder data are given.

121. DESLEY, I.: Contribution to the analysis of aluminium and titanium. Its application to bauxites. Bulletin Signalétique du Cédocar, Vol.1. No. 221. Oct. 1974. p.76 /French/

Described are methods and tests to define the composition of aluminium and titanium in minerals. A new analytical method for aluminium is indicated, including experiments of interferences and results received with bauxite samples. Titanium ratios were defined by colorimetry. The method is finally generalized.

122. DUBINCUK, V.T. et alii: X-ray diffraction and electron microscopic study of bauxites. Rentgenografija Mineralnogo Syrja, No.10, 1974. pp. 19-24. /Russian/

X-ray diffraction and electron microscopic data are used to study the phase mineral composition amount of these phases, interrelation between the phases and the matrix, morphology of ores and the degree of crystallinity of bauxite. The samples contain predominantly gibbsite and boehmite.

123. FERRANTE, M.J.: Thermodynamic data for synthetic dawsonite. Washington, D.C. 1976. U.S. Dept. of the Interior, Bureau of Mines, in: Rep. Invest. No. 8129, 13 pp.

The standard enthalpy of formation, low-temperature heat capacities and enthalpy increments over 298 K were determined for synthetic dawsonite  $\text{NaAlCO}_3/\text{OH}/_2/$ . The enthalpy of formation was determined by hydrochloric acid solution calorimetry.

124. GIESE, R.F.: Hydroxyl orientations in gibbsite and bayerite. Acta Crystallographica, Vol. B 32, No.6, 1976. pp. 1719-1723.

The H positions in bayerite and gibbsite /both  $\text{Al}/\text{OH}/_3/$  were determined by minimizing the electrostatic energy as a function of hydroxyl orientation for a fixed O-H distance. The H positions in gibbsite are known from an accurate X-ray refinement and one of the H-H distances is short /2.122 Å/. The point charge model /fully ionized atoms/ separates these hydrogens resulting in deviations from the observed OH orientations of about 18 degrees. Several models with reduced charges on the ions were refined with no improvement in the hydroxyl orientations.

125. GOUT, R.: Effects of mechanical exposure on diasporite. Comptes Rendus, Académie des Sciences de Paris, Série D. Vol.282, No.10. 8.Mar. 1976. pp. 945-948.

Crushing of diasporite results in badly crystallized formations, which can be dehydrated at very low temperatures only. When crushing is done with a shocklike impact, a formation of amorphous composition is seen under X-rays, and the crystal lattice of corundum becomes much more dilated through imperfections.

126. GOUT, R.; JAUBERTHIE, R.: Two varieties of diaspore. Comptes Rendus, Académie des Sciences de Paris. Ser.D, Vol.282, No.19, 17 May 1976. pp. 1697-1700. /French/

Two varieties of diaspore /well- and badly crystallized/ can be distinguished by thermal analysis or by infrared spectroscopy. On X-ray diffraction diagrams the two varieties give homologous lines, the height and the surface of which are very different, but it is possible to determine a "corrected surface" which allows the quantitative analysis of the diaspore independent of its degree of crystallinity.

127. GUPTA, A.K.; EDGAR, A.D.: Phase relations in the system nepheline-leucite-anorthite at one atmosphere. In: Canadian Mineralogists, Vol.12, No.5, 1974. pp. 354-356.

The title system was studied at 1 atmosphere to determine the mutual phase relations of these minerals. The nepheline/Ne/-leucite/LC/-anorthite/An/ join cuts the primary phase volumes of beta- $Al_2O_3$ , corundum, carnegieite, nepheline, leucite and anorthite.

128. HUSSEIN, M.K. et alii: Extraction of alumina from local non-bauxitic aluminium deposits. Pt.1. Physicochemical studies of Egyptian non-bauxitic aluminium deposits. Chemie der Erde, Vol.33. No.1, 1974. pp. 62-85.

Clay deposits from Sabba and Aswan districts and a nepheline syenite deposit from Gabal Abu Khruq were analyzed. The Al was found in clays mainly in kaolinite, and in nepheline syenite in albite, nepheline and thomonite. Sabba clay contained high amounts of  $Al_2O_3$  /36,9 per cent/ and Aswan clay showed lower contents /27,36%/. Both clays are characterized by low alkali, CaO and MgO contents. The nepheline samples showed high alkali contents /about 15%/ and 1,55%  $Al_2O_3$ .

129. IRUTEK, D.; JUNGSMANN, E. et alii: Solubilities of boehmite from Yugoslav bauxites. In: Symposium sur les bauxites oxydes et hydroxydes d'aluminium. Vol.2. Zagreb 1-3 Oct. 1963. Zagreb, 1964. Académie Yougoslave of Sci. Arts, pp. 181-187.

A method was sought for by which a bauxite could be defined in a straightforward manner regarding its osustic digestibility. Further accumulation of experimental evidence on the chemical behaviour of boehmite from Yugoslav bauxites ought to be helpful in elucidating the genesis of this important raw material.

130. JUNGSMANN, E.; KLARIC, K. et alii: A proton magnetic resonance and infrared study in the series: aluminium hydroxide gel, pseudoboehmite, boehmite. In: Symposium sur les bauxites, oxydes et hydroxydes d'aluminium, Zagreb 1-3 Oct. 1963. Zagreb, 1964. Acad.Yougoslave Sci.Arts, Vol.2. pp. 137-142.

This is an account of the present status of a research into some structural aspects of the mechanism of ageing in the series: aluminium hydroxide gel, pseudoboehmite, boehmite.



131. KAKASY, I.: The reduction of silicon dioxide content of bauxites from Halimba. In: Public. of Hungarian Mining and Research Institute, Vol. 18. 1975. pp. 68-74. /German/

The bauxite from Halimba, Hungary, has a high content of boehmite, and most of the silicic acid is in the smallest particles. The technological basis of the leaching stage for purifying the product is described.

132. KOMLÓSSY, G.: Mineralogical composition of the Iszkaszentgyörgy bauxite. In: Proc. II. International Symposium of ICSOBA. Budapest, Oct. 6-10, Budapest, 1971. Res. Ins. Non-Ferrous Metals, pp. 131-144.

The results of some 300 mineralogical examinations carried out by the author on bauxite samples from Iszkaszentgyörgy were discussed in detail.

133. KUROSAWA, T.; KIKUCHI, T.; YAGIHASHI, T.: Thermal properties of bauxites and Japanese colloidal earth. In: Proc. II. International Symposium of ICSOBA. Budapest, Oct. 6-10, Budapest, 1971. Res. Ins. Non-Ferrous Metals, pp. 145-155.

The thermal behaviour of bauxites and colloidal earth was investigated. Infrared and nuclear magnetic resonance proved decomposition of gibbsite to occur at 110°C. Residual moisture was clearly detected in the infrared spectrum even at 900°C.

134. LAHODNY-SARC, O.; WHITE, J.L.: Study of acidic action on the structure of kaolinite and boehmite in Yugoslav white bauxite. In: Proc. II. International Symposium of ICSOBA. Budapest, Oct. 6-10, Budapest, 1971. Res. Ins. Non-Ferrous Metals, pp. 122-130.

In this work they have tried to elucidate the mechanism of the formation of this gel by examining the processes of dissolution of the white bauxite under experimental conditions similar to those in nature. The kinetics of the dissolution and changes in the residue were studied as a function of temperature and pH of the solutions by infrared and X-ray diffraction techniques.

135. LEE, H. et alii: Kinetics of the dehydration reaction of domestic alunite ore. Yo-up Hoeji, Vol. 9, No. 3, 1972. pp. 78-81 /Korean/

Thermogravimetric analysis was used to determine the order and activation energy of the dehydration of alunite. Alunite are containing some diokite,  $Al_2O_3$  32,40,  $SO_3$  31,8,  $SiO_2$  10,8,  $Fe_2O_3$  3,93,  $K_2O$  9,05 and  $H_2O$  9,47% was ground, sieved and treated with 0.1N  $H_2SO_4$  to yield a purified product containing very little diokite and  $Al_2O_3$  36,9,  $SO_3$  31,51,  $SiO_2$  3,20,  $Fe_2O_3$  0,09,  $K_2O$  8,31 and  $H_2O$  15,0%. The activation energy of the impure alunite was 58,9 cal and the dehydration reaction order was 0,8. The activation energy of the purified alunite was 38,4 cal and the dehydration reaction order was 1,0.

136. LEITEIZEN, M.G.: Characteristics of sodium hydro-alumino-silicates forming during bauxite digestion. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan.18-21, 1972. Leningrad. Budapest, 1975. VAMI-KFKI, pp. 167-179.

As a result of the studies conducted by X-ray diffraction, infrared absorption spectroscopy and differential thermal analysis the characteristic features of sodium hydroaluminosilicates of the sodalite, nosean and cancrinite types have been found. The existence of an intermediate form of nosean-cancrinite, which is often met in alumina production has been shown.

137. MALTS, N.S.; ZINKEVICH, Z.D.: Influence of lithological peculiarities of high silicon bauxites on conditions of Bayer process. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI. Jan.18-21, 1972. Leningrad, Budapest. 1975. VAMI-KFKI, pp. 307-320.

With mass entry of bauxites into production a ratio of lithological varieties varies in a wide range and this influences the operation of main sections of Bayer process: digestion, desilication, red mud thickening. This necessitates the more detailed study of influence of lithological peculiarities of bauxite on its processing. It is shown that different speed and degree of desilication when digesting the clayey and stony varieties of bauxite are caused by different dispersion and amount of kaolinite in bauxite and sodium hydroaluminosilicate formed during digestion which serves as seed.

138. MEDVEDEV, G.P.: Effect of the mineralogical composition of iron and silica content on caking of bauxite charges. Nauchno-Tekhnicheskaja Konferencija Uralskogo Politehnicheskogo Inetituta, Vol.4, No.1, 1972/1973, pp.19-20. /Russian/

Sintering of three-component charges /soda, limestone bauxite/ with Fe in different mineralogical forms and different amounts of  $SiO_2$  was studied at 1100 to 1300 C. The silica modulus in the charge was varied from 1,8 to 4,0. The obtained cakes were leached. The ore minerals of Fe and  $SiO_2$  content in bauxite affected the formation of cakes.

139. MERCIER, H.; NOBLE, M.: Optimization of the alkaline treatment of the different bauxite varieties. New York, N.Y. 1974. Metallurgical Society of AIME /TMS Paper No. A74-71/ p.10.

The bauxites mined and quarried in the different parts of the world differ from each other in the mineralogical nature of the aluminum and silicon oxides contained. The conditions for designing and operating alumina plants thus depend on the mineralogical nature of the ore treated, as well as on the economical parameters concerning the plant site. In an optimization study for any particular alumina plant, these

compulsory conditions, physicochemical due to the mineralogy of the ore to be treated, and economical, proper to the plant site, must therefore be taken into account.

140. MILNE, D.J.: Chlorination of bauxite in the presence of silicon tetrachloride. Metallurgical Transactions, B, Vol.6 B, No.3. Sept. 1975. pp. 486-498.

The chlorination rates of bauxite were studied in a specially designed continuously recording thermobalance suitable for use with corrosive gases.  $Cl_2/C$  and  $Cl_2/CO$  mixtures were used to chlorinate the ore.  $SiCl_4$  was injected into the inlet gas stream, using a technique whereby the vapour was continuously added via the capillary outlet from a constant pressure boiler. Electron probe microanalysis was used to determine the initial and final levels of Al and Si in the bauxite.

141. MINNES, D.G.; KRIENS, J.: Nepheline syenite. Place in world markets. In: Proceedings of Industrial Minerals. International Congress, London, 1975 Met.Bull.Ltd. pp. 159-168.

The mineralogical properties, occurrence and uses of nepheline syenite are reviewed.

142. NEW METHODS of studying bauxites. Complex study of dispersed ores /as illustrated by osumite boehmite bauxites of the Kursk Magnetic Anomaly/. Moskva, 1972. Vses. N.-I Inst.Mineral Syrja, p.179.

143. NURMAGAMBETOV, K.N. et alii: Coagulating the clay fraction of hydrargillite bauxite. Metallovedenie Metallov. No.3, 1974. pp. 177-178. /Russian/

Optimal conditions for bauxite coagulation from the hydrargillite fraction were obtained by using water at  $45^{\circ}C$  with a contact time of less than 10 min and the polyacrylamides PAG-1, PAG-3 or PAA-MF as flocculating agents /150 g/ton/.

144. PASHKEVICH, L.A.: Quantitative determination of siderite content in bauxite ores. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18-21, 1972. Leningrad, Budapest, 1975. VAMI-KFKI, pp. 149-154.

The essence of this method consists of that upon heating the ore to the temperature of siderite dissociation the latter starts to decompose and free carbon dioxide which enters the gas burette designed on the principle of a gas thermometer where gas volume was measured. Data of the obtained volume of the gaseous phase after deduction of obnoxious volume were calculated on percentage of siderite.

145. PASHKEVICH, L.A.: Thermographic study of low quality bauxites. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, pp. 143-148. January 18-21, 1972, Leningrad. Budapest, 1975. VAMI-KFKI, pp. 143-148.

During the search of new deposits of alumina containing ores low quality bauxites are often found. In study of such bauxites thermo-analytical characteristics were obtained which do not exist when studying high quality bauxites. Some practical observations of differential thermal analysis of high ferrous bauxites are the subject of this report.

146. PAULIK, J.; PAULIK, F.: Thermal gas-titrimetric study of bauxites. In: Therm. Anal., Proc. Int. Conf., 3rd, Birkhaeuser, Basel, 1972. Vol.1, 1972. pp. 489-498. /German/

The thermal gas-titrimetric method of Paulik et al. /1966/ which involves recording of thermal, DTA, thermogravimetric and differential thermogravimetric curves with simultaneous determination of gaseous decomposition products, for example,  $\text{CO}_2$ ,  $\text{SO}_2$ ,  $\text{SO}_3$  and  $\text{NH}_3$  was used to determine the mineral composition of bauxites. In addition to the main mineral components, pyrite, sulfate, carbonate and organic substances can be rapidly determined.

147. POBEQUIN, Th.; RAUTUREAU, M.: Electron microscopic study of some minerals of bauxite. Journal de Microscopie, Paris, 1973. Vol.17, No.2, pp. 131-138. /French/

Pisolites of diaspore in Montseron bauxite show extremely small, homogeneous and very pure microcrystals which do not possess the morphology of known natural diaspores. Jambet bauxites contain pisolites of kaolinite and halloysite. The kaolinite is rather poorly developed and shows abnormally high water losses on thermogravimetric analysis.

148. PONCE, S. et alii: Thermoanalytical study of bauxite, Estudios Geograficos, Vol.30, No.4/6, 1974. pp. 605-610. /Madrid//Spanish/

The bauxite samples were studied by thermogravimetric analysis, differential thermogravimetric analysis and DTA. The matrix was composed essentially of boehmite and gibbsite with varying amounts of kaolinite and metahallosite. Pisolites contained boehmite, gibbsite and hematite with little or no kaolinite.

149. POPPLETON, H.O.; CAMPBELL, I.I.: Preliminary investigation of desilication of minerals with sulfur and carbon. Washington, D.C. U.S. Dept of the Interior, Bureau of Mines, Rep. Invest. No.7950, 1974, p.8.

A possible method for selectively removing the  $\text{SiO}_2$  component of silicate minerals and ores was investigated. Of specific interest were Al ores and zircon. Methods are described for removing  $\text{SiO}_2$  from

these ores as volatile silicon sulfides by treating the ore with S and C, with S, C and a reducing gas, or with S compounds and C. Comparative results are also given for the desilication of some of the ores with C alone to form volatile SiO.

150. PRADESH, A.; RAMAN, P.K.: The bauxite deposits of Anantagiri, Visakha-patnam district. Journal of Geological Society, India, Vol.17, No.2, 1976. pp. 236-244.

Bauxite /Bt/ forms cappings at 1090-1445 m above mean sea level, over the garnet-sillimanite gneisses in the title region. The Bt is light to dark brown or pink and moderately hard with crystalline gibbsite in varying proportions. A typical profile of the Bt residuum in the area consists of a lateritic Bt underlain by partially lateritized khondalitic gneiss or lithomarge followed by kaolinized and unaltered khondalitic gneiss.

151. RAZZAGHE-KARIMI, M.; ROBERT, M.: Weathering of micas and geochemistry of aluminum role of the configuration of the organic molecule in the suitability for complex formation. Comptes Rendus, Académie des Sciences de Paris, Ser.D, Vol.280 D, June, 16, 1975, pp. 2645-2648 /French/

By comparing the liberation of Al from micas by various N/100 organic acids and the configuration of the organic molecules concerned, it is possible to define the mechanism of complex formation. The important elements at the level of the developed formula of the acids are the number and proximity of the COOH groups.

152. REEVE, E.J.; ANDERSON, G.M.: Melting relations of nepheline rocks from the York River Area, Banoroft, Ontario, Indian Journal of Earth Sciences, Vol.6, No.3, 1976. pp. 88-96.

Samples of nepheline gneiss and nepheline pegmatite /chemical analyses given/ were equilibrated with H<sub>2</sub>O /and CO<sub>2</sub> in some experiments/ at pressures 9,5 kbar or less. Melting relations are shown in diagrams. Melting began at 650 to 800°C.

153. REZAPOV, A.N.; SERIKH, A.S.: Possible use of gamma-spectrometry in the prospecting and exploration of bauxite deposits. In: Tr.Sib. N-I Inst. Geol., Geofiz.Miner.Syrja, 1971. No.126, pp. 142-149. /Russian/

The different gamma-spectrometric methods, for prospecting bauxite deposits, are used through a determination of the contents of radioactive elements. Three groups are recognized based on the radioactivity of bauxite; practically non-radioactive, weakly radioactive and highly radioactive. The groups are subdivided based on their magnetic susceptibilities.

154. ORBÁN-KELEMEN, M.: Quantitative phase analysis of red muds. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 17-21, 1972. Leningrad. Budapest, 1975. VAMI-KFKI, pp. 267-294.

Three methods are being used in our laboratory for phase analyses: X-ray diffraction, derivatography and IR spectroscopy. The three methods - while X-ray diffraction applied singly yields most information - effectively complement one another. Their simultaneous application yields extensive information concerning phase composition, morphology and internal structure of red muds.

155. RUDASEVSKIJ, L.S.; NEROSLAVSKAJA, L.L.: Nature of sediments formed in bauxite sludges. Trudy VAMI, 1975. No. 91, pp. 112-119 /Russian/

The dependence of the mineral composition of sediments formed during bauxite leaching on process parameters was determined experimentally. Autoclave sediment contents of several trials are presented for varying temperature /140 to 280°C/ and CaO content /4,0 to 12%/. The mechanism of sediment formation is discussed.

156. SAFONOVA, O.F.: System with participation of aluminium under standard conditions. Problemy Genezisa Boksitov, Moskva, 1975. Nauka, pp. 280-288. /Russian/

To explain paragenesis of bauxite, information must be obtained about the nature of systems such as  $\text{Al}_2\text{O}_3\text{-H}_2\text{O}$ ,  $\text{Al}_2\text{O}_3\text{-Fe}_2\text{O}_3\text{-H}_2\text{O}$ ,  $\text{Al}_2\text{O}_3\text{-FeO-H}_2\text{O}$ , etc. Solubility of  $\text{Al}_2\text{O}_3$  was determined in these systems as a function of pH and  $\text{SO}_4^{2-}$  concentration.

157. SAPIEV, K. et alii: Study of the leaching of highly ferruginous bauxites by sulfuric acid. Himija i Tehnologija, Kiev, 1975, No. 6, p. 62. /Vol. 6./ /Russian/

Effects of temperature, time of leaching and  $\text{H}_2\text{SO}_4$  concentration on  $\text{Al}_2\text{O}_3$  and  $\text{Fe}_2\text{O}_3$  leaching from bauxites containing 40,8  $\text{Al}_2\text{O}_3$ , 27  $\text{Fe}_2\text{O}_3$ , 8,7  $\text{SiO}_2$ , 2,2  $\text{TiO}_2$ , 0,75 CaO, 0,2 MgO, 0,1  $\text{K}_2\text{O}$ , 0,4  $\text{Na}_2\text{O}$  and 0,7%  $\text{SO}_3$  are studied. The best results were obtained with: leaching temperature 120°C, leaching time 90 min.,  $\text{H}_2\text{SO}_4$  concentration 60% and stoichiometric amount of the acid calculated for the content of Al, Fe and Ti. Under these conditions  $\text{Al}_2\text{O}_3$  and  $\text{Fe}_2\text{O}_3$  separation into the solution was 94 and 93%, respectively.

158. SAPIEV, K. et alii: Clarification and filtration of sulfuric acid pulps during the leaching of high-iron bauxites. Himija i Tehnologija, Kiev, 1976. No. 1, pp. 5 to 7. /Russian/

During leaching of bauxites with  $\text{H}_2\text{SO}_4$  the greatest difficulty occurs when the acid solution is separated from the finely dispersed solid phase, mainly amorphous  $\text{SiO}_2$ . The effects of temperature, the solid-

to-liquid phase ratio in the pulp and the addition of the polyacrylamide were studied.

159. SAKATINSKIJ, G.B. et alii: Study of conditions for obtaining alumina from poorly alunitized rock by a composite method. Azerbaidžanski Himičeski Žurnal, 1975, No.4, pp. 95-98. /Russian/

The rock was calcined 2 hr at 620°C, then leached with H<sub>2</sub>SO<sub>4</sub> at 90-95°C. The acid solution containing Al<sub>2</sub>/SO<sub>4</sub>/ with Fe impurities was used to treat repeatedly some new portions of the calcined rock, thus removing the Fe. Then, it was treated 45 min. at 50 to 60°C with a 10% NaOH solution to give aluminate solution. The latter was evaporated and cooled to 20 to 25°C, some of the sulfate salts crystallized, and the main component attained a concentration suitable for precipitation of Al<sub>2</sub>O<sub>3</sub>.

160. ŠIŠAKIN, O.V. et alii: Rational complex of nuclear geophysical studies of boreholes at deposits of bauxites with gibbsite composition. In: Razved.Geofiz. SSSR Rubežne 70 /Semidesjatyk/ Godov.Mater.Vses.Naučno-Tehn. Geofiz.Konf., 7th, 1972. Moskva, 1974. Nedra, USSR, pp. 339-343. /Russian/

Nuclear geophysical logging of gibbsite bauxite deposits in northern Kazakhstan determined the following composite method with radioisotope sources of radiation: induced activity logging /IAL-<sup>28</sup>Al/, selective gamma-gamma logging /GGL-S/ and density gamma-gamma logging /GGL-D/. Results determined by the composite geophysical method and by sampling of cores are compared.

161. SMIRNOV, M.N. et alii: Synthesis and properties of solid solutions of sodium aluminate and sodium ferrite. Trudy VAMI, 1975. No.91, pp.44-46. /Russian/

The phase composition of sinters and the behaviour of solid solutions formed during their interaction with alkaline solutions were studied to determine the optimum parameters for alkaline treatment of high-silica /SiO<sub>2</sub> about 44%/ bauxites. Based on chemical, crystallographic and X-ray data, the chemical compositions and molecular ratios of the synthesized phases and of the solid solutions formed are presented.

162. SOLYMÁR, K. et alii: Evaluation of Soviet and Hungarian bauxite reference standards from the view of the Bayer cycle. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18 to 21, 1972, Leningrad.- Budapest, 1975. VAMI-KFKI, pp. 229-266.

The results of technological tests performed with 10 Soviet and 7 Hungarian bauxite samples, leaning partly on mineralogical and petrological results and partly on results of red mud phase analysis, and following the concept on technological test methods of bauxites in Hungary.

163. SOLYMÁR, K. et alii: Chromium-containing boehmite and aluminium-containing chromium mineral in a bauxite sample from Severoonezhsk. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan.18 to 21, 1972. Leningrad. - Budapest, 1975, VAMI-KFKI, pp. 155-162.

The samples were subjected to phase analysis by X-ray diffractometry. To study isomorphously incorporated Cr in boehmite, model substances were hydrothermally prepared and studied. The model experiments confirmed isomorphous incorporation of chromium atoms in the boehmite lattice.

164. SOLYMÁR, K.: Methods applied in Hungary for the evaluation of bauxites from the view-point of alumina production. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI. Jan.18 to 21, 1972. Leningrad.- Budapest, 1975. VAMI-KFKI, pp. 213-227.

Bauxite grading is based on quantitative phase composition and texture. Evaluation is limited to the Bayer process. Fundamental data are digestable alumina percentage and specific caustic consumption. The grading method consists of petrological and mineralogical studies and technological tests.

165. SOSEDKO, J.A.; ORLOVA, M.P.: X-ray structural studies of nepheline-kalsilite associations that are analysable only with difficulty. Rentgenografija Mineralnogo Syrja, Vol.9, 1973. pp. 123-127. /Russian/

By the qualitative and quantitative X-ray phase analysis of mineral associations of fine-grained alkaline rocks and cryptocrystalline formations /pseudoleucitites/, the regular changes in mineral composition and quantitative relations were determined. Mineralogical /optical/ methods alone were unable to detect changes in the composition of K-feldspars and differentiate nepheline from kalsilite in polymineralic intergrowths.

166. SUTYRIN, Ju.E. et alii: Interaction of alumina-containing minerals with ammonium sulfate. Zurnal Prikladnoj Himii, Vol.47, No.5, 1974. pp. 957-959. /Russian/

The study of the reaction of  $Al_2O_3$ -containing minerals with  $NH_4/2SO_4$  indicates that during sintering of kaolinite-boehmite products with  $NH_4/2SO_4$  together with kaolinite, hydrargillite and boehmite were observed with the formation of Al-ammonium-quartz. Boehmite was the most resistant mineral. The optimum conditions for sulfation in  $450^{\circ}C$  and 1,5 hr which guarantees 89% conversion in solutions of  $Al_2O_3$  containing moisture. This method is recommended for sampling and treatment of clay, kaolin, high-Si-containing hydrargillite and boehmite.



167. SUTYRIN, Ju.E. et alii: Influence of calcining on the decomposition of a boehmite-kaolinite product by nitric acid. *Izvestija Vysših Učebnyh Zavedenij, Cvetnaja Metallurgija*, 1974. No.3, pp. 44-47. /Russian/

A study was made on the effect of calcining Al ores on their subsequent decomposition in 40% nitric acid at 90 and 160°C. The product was crushed to a particle size of 0,044 mm. Without calcining, the nitric acid had a weak effect on disaggregation at 90°C, but at 160°C the hydrargillite was decomposed slightly, the kaolinite to a lesser degree and the boehmite was unaffected. Calcining at 600°C was very effective in leaching 49% Al and 40% Fe into solution with the nitric acid at 90°C.

168. STYPINI, Ju.E. et alii: Nitric acid autoclave stripping of concentrations of high-silicate bauxites. *Light Metal Age*, Vol.34, No. 1/2, Febr. 1976. pp. 9-10.

Laboratory-scale nitric acid leaching of calcined boehmite-kaolinite ores in an autoclave points the way to the economical extraction of Al from low-quality bauxites with high-silica content. The original product obtained through enrichment of high-silica bauxites and its treatment are described. The effects of time, temperature and acid consumption on Al and Fe recovery are discussed.

169. TIHONOV, N.N.: The main criteria for evaluating the technological properties of bauxites for alumina production by the Bayer process. *Razvedka i Ochrana Nedr*, No.12, 1974. p.9.

Previous abstracted from original as item 7408-21-0020. An equation is given for determining the amount of NaOH needed for the extracting of clay from bauxite ores of different deposits.

170. TIHONOV, N.N.: The main criteria for evaluating the technological properties of bauxites in the production of alumina by the Bayer process. *Razvedka i Ochrana Nedr*, No.12, 1974. pp. 20 to 25. /Russian/

An equation is given for determining the amount of NaOH needed for the extraction of clay from bauxite ores of different deposits.

171. TIHONOV, N.N.; LAPIN, A.A.: The main technological parameters and technical-economical indices during treatment of different quality bauxites by Bayer's method. In: *Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI*, Jan.18-21, 1972, Leningrad. - Budapest, 1975, VAMI-KFKI, pp.201-211.

When examining the technological characteristics of bauxites as applied to Bayer's method, the following points are to be studied: the solubility of aluminium oxide containing in bauxite /equilibrium modulus/, the digestion kinetics, the losses of alumina and caustic soda together with the dump mud, the settling ability of red mud, the content of organic matters.

172. TSEKHOVOLSKAYA, D.I.; NIKOLAEVA, L.J.: Study of sodium hydroaluminosilicates structure by infrared absorption spectroscopy. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan.18-21, 1972. Leningrad. - Budapest, 1975, VAMI-KFKI, pp. 181-187.

The aim of the present work was the study of the structure of sodium hydroaluminosilicates in various red muds and white muds /desilication products/. It has been shown that the four types of structure of sodium hydroaluminosilicates, zeolite A, sodalite, nosean and cancrinite, differ by the nature of zeolite water, which is removed at various temperatures without destroying the Al-Si framework.

173. VICOL, C. et alii: Dressing of the bauxite from Ohaba-Ponor. Cercetari de Mintere, Vol.14, 1973. pp. 311-315.

Concentration tests were done on four samples obtained from Comarnic lens, Ohaba lens, Varnita lens and Murgoi lens. The first two are similar in the mineral composition and contain boehmite 52-57, Fe oxides and hydroxides 28-29 and clay minerals 11-16%. The third sample contains clay minerals 41-42, Al hydroxides 26-27, Fe oxides and hydroxides 22-23, quartz about 3 and sericite and mica 4 to 5%. The fourth sample contains clay about 65%, Al hydroxides about 10 and Fe oxides and hydroxides about 20%.

174. VÖRÖS, I.: Micromineralogical investigations of the bauxite sections of Gánt, Hungary. In: Proc. II. International Symposium of ICSOBA, Budapest, Oct. 6-10, 1969, Budapest, 1971. Vol.2, Res. Ins. Non-Ferrous Metals, pp. 31-37.

Of the samples taken from 7 various sections 61 were examined. The qualitative tests carried out by X-ray analysis revealed the presence of the following minerals: quartz /3 varieties/, gypsum, dolomite, muscovite /2 varieties/, biotite, amphibole /3 varieties/, epidote, rutile, pseudo-morphic rutile from titanous hematite, spessartine, tourmaline /2 varieties/, zircon /2 varieties/, corundum, titan-hematite /3 varieties/.

175. WHITE, J.L.: Applications of infrared spectroscopy to the study of bauxite and bauxite constituents. In: Proc. II. International Symposium of ICSOBA, Budapest, Oct.6 to 10, Budapest, 1971. Vol.2, Res. Ins. Non-Ferrous Metals. pp. 115-122.

High resolution grating spectrophotometers provide detailed information on hydryl stretching frequencies of constituents of bauxites such as gibbsite, boehmite and kaolin minerals.

176. ZAPOLSKIJ, A.K. et alii: Solubility of aluminium sulphate in  $Al_2/SO_4^{3-}-H_2SO_4-H_2O$  system. Ukrainskij Hیمیčeskij Žurnal, Vol.40, No.1, 1974. pp.40-43. /Ukrainian/

By considering the technological treatment of highly siliceous Al ores

with  $H_2SO_4$ , the solubility of  $Al_2O_3/SO_4^{2-}/3$  in the  $Al_2O_3/SO_4^{2-}/3-H_2SO_4-H_2O$  system at 40 and 100°C was studied. Solubility isotherms of  $Al_2O_3/SO_4^{2-}/3$  in the system at 40 and 100°C are presented. The tables of  $Al_2O_3/SO_4^{2-}/3$  solubility in 90% or less  $H_2SO_4$  at 40 and 100°C contain compositions of mother liquor  $[Al_2O_3, SO_4^{2-}, H_2O]$ , compositions of saturated solutions  $[Al_2O_3/SO_4^{2-}/3, H_2SO_4, H_2O]$ .

177. ZAVARITSKAYA, T.A.: Application of physico-chemical methods of research for study of surface properties of red muds. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan.18-21, 1972, Leningrad. - Budapest, 1975, VAMI-KFKI, pp. 189-197.

The obtained results show that hydrophilic character of muds certainly depends on their composition. Here evidently the state of the substance in the system /dispersion, degree of crystallization, etc./ is also important. The study of physico-chemical properties of red muds together with the methods of phase X-ray structure analysis, DTA and other methods, it is possible to more fully characterize the properties of these materials.

178. ZELITKOV, V.S. et alii: Development and application of nuclear geophysical methods for well logging and geophysical sampling. Appraising the grade of bauxites in boreholes by neutron activation with an energy of 14 MeV and spectrometry of Gamma-ray induced activity. In: Tr.Vses. N-I Inst.Yad.Geofiz.Geohimija, No.13, 1972, pp. 66-74. /Russian/

A direct method for the estimation of  $Al_2O_3$  in bauxites described through neutron well-logging based on the nuclear reactions  $^{27}Al/n, \gamma$  /  $^{28}Al$  /thermal neutrons/ and  $^{27}Al/n, p$  /  $^{27}Mg$  and  $^{28}Si/n, p$  /  $^{28}Al$  /fast neutrons/. The  $SiO_2$  content is determined by the activation of Si with fast neutrons. Fast neutrons of 14 MeV energy are generated in the 10 H<sub>2</sub> range at  $10^7$  neutrons/sec from a  $^{252}Cf$  source. The intensity of gamma-ray induced activity of Si /in relative units/ is a function of the  $Al_2O_3$  and  $SiO_2$  contents %/.

#### 4. BAUXITE DEPOSITS OF THE WORLD

179. Africa-dissecting a giant. Mining Journal, Vol.287. No.7369. 12.Nov. 1976. pp. 373-374.

The African production of bauxite amounts to about 10 million tonne/year, with Guinea being the fourth largest world producer. Nevertheless, total African bauxite is only 15% of world output.

180. Aluminium. Aurukun project doubts. Mining Journal, Vol.286. No.7341. 30.Apr. 1976. p.342.

Delays, rising costs and the demands being made by local churches and the aborigines could result in the development of the major bauxite project planned for Aurukun, Queensland, never taking place.

181. Aluminium. Brazilian developments get set. Mining Journal, Vol.287. No.7362. 24.Sept. 1976. p.229.

The exploitation of the massive bauxite reserves of Trombetas and Paragominas, the most advanced project is that of the Brazilian-controlled Mineraco do Rio Norte. Quite recently Alcoa announced its intention to file a preliminary request for mining permits on bauxite concessions in the Amazon region.

182. Aluminium plant for Costa Rica. Mining Journal, Vol.287. No.7365. 15.Oct. 1976. p.304.

A recent decision by the state development corporation, Codesa, to set up a \$ 40 million aluminium product plan in association with Italian interests could mean some progress on the bauxite mining front.

183. Australia. Revived hopes for bauxite. Mining Journal, Vol.287. No.7373. 10.Dec. 1976. p.455.

Two Western Australian bauxite projects might be getting off the ground at last. Alumax Inc. recently announced that it is to undertake intensive feasibility studies on the economics of developing refractory and other high grade bauxite reserves contained in leases held by the company in the Mitchell Plateau area of Western Australia's Kimberley region.

184. Australia's reappraisal. Aluminium raw materials. Metal Bulletin, No.65. May 1976. pp. 29-30.

The Al industry has been one of Australia's most rapid growth industries. Bauxite deposits at Weipa, Queensland, Gove, Northern Territory and in the Darling ranges in Western Australia, discovered during the 1950's, contain at least 3500 m tons of commercial grade ore. These, and refineries at Gladstone, Queensland, Gove, Kwinana, W. Aust. and Bell Bay, Tasmania, are discussed. Considerable imports of NaOH will be required, since present Australian production is only 80 000 tons. Australian companies are tabulated, with operations and plants /including smelters/.

185. Bauxite in the Americas. Revue de l'Aluminium, No.455. Oct.1976. pp. 439-440.

In the third quarter of 1976. the estimated output of the electrolysis plants in the United States reached 85%. The mining experts of Brazil discovered in the vicinity of the iron ore deposits of Carajas also bauxite, their extent to be estimated to be about 58 million tons, with a 40% alumina content. The bauxite reserves of Jamaica are estimated by the Jamaican Bauxite Institute to attain about 2 milliard tons.

186. Bauxite in Guinea. Revue de l'Aluminium, No.446, Dec. 1975. pp.529-531.

According to certain informations, the bauxite projects at Tougué and Dabola - which were intended to be exploited separately - will be joined into one project. The minister for economy and finances estimates the bauxite deposits of Guinea to 8 milliard tons.

187. Bauxite in Hungary. Revue de l'Aluminium, No.449. Mar.1976. pp. 115-117.

It is estimated that the bauxite mine Rákhegy 2. in the region of Inota produced 480 000 tons of mineral in 1974.

188. Bauxite in Venezuela and Australia. Revue de l'Aluminium, No.447. Jan. 1976. pp. 11-12.

Venezuela, having been so far a buyer of bauxite, is preparing to prospect for its own high quality bauxite deposits, further, to find possibilities to utilize its low quality deposits. According to a survey, Australia is in the possession of proven bauxite reserves of about 4,7 milliard metric tons, representing 30% of the total world reserves.

189. Bauxite. Indian exploration progresses. Mining Journal, Vol.288. No. 7379. 21.Jan. 1976. p.44.

Detailed study of India's coast bauxite belt indicates that exploitable reserves of over 30 million tonnes will be proved in the Andhra Pradesh section, with possibly another 40 million tonnes in Orissa.

190. Bauxite in Australia and South Africa. Revue de l'Aluminium, No.456. Nov.1976. pp. 505-507.

Australia is hopeful to resume alumina export and probably bauxite deliveries too, owing to the fact that their electrolysis plants are regaining their usual market share step by step. According to the Bureau of Mines in Johannesburg, the recently discovered bauxite deposits in the Natal province of South Africa are so important, that they are filling the long-needed gap in the country's mining industry.

191. BÁRDOSY, G.: Bauxite deposits of Hungary. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 1969. Budapest. 1971. Vol.2. Res. Ins. Non-Ferrous Metals. pp. 9-20.

The Hungarian bauxite deposits are overlain the karsted surface of dolomite or limestone. One can distinguish layer-type and lenticular deposits as well karst depressions filled with separate bauxite bodies. The theories of the origine of bauxite are discussed, emphasizing the questions of the base material, of the bauxitisation, disputed nowadays.

192. BENSON, V.; TAKEUCHI, K.: Developing countries and non-fuel minerals. Foreign Affairs on American Quarterly Review. Vol.52. No.3. Apr. 1974. pp. 497-498.

The mine major minerals to be examined in this article iron ore, bauxite, copper, manganese ore, lead, nickel, phosphate rock, zinc and tin. Account for 85 percent of the estimated value of world production of all non-fuel minerals; they are also the non-fuel minerals of export interest to the developing countries, accounting in 1970 for 12 percent of the aggregate exports of developing countries.

193. Birth of Jamalco. Mining Journal, Vol.287. No.7365. 15.Oct. 1976. p.297.

Alcoa will continue to manage operations but the agreement gives both parties the right to, separately or jointly, expand the operation - a bauxite reserves area having been designated to support any expansion, Jamalco's rights to the reserves are covered by mining leases assuring the venture of 40 years supply of bauxite.

194. BRACEWELL, S.: Bauxite, alumina and aluminium. London. 1962. Her Majesty's Stationery Office. 235 pp.

Bauxite. The occurrence of aluminous materials in the earth's crust. Nature and composition of bauxite. Age, stratigraphy and mode of occurrence. Geographical distribution. Exploration. Mining and beneficiation. Uses, specifications and prices. World production and trade. Bauxite resources of the world. Substitutes for bauxite. Alumina. Aluminium. Bauxites, alumina and aluminium in commonwealth territories. Bauxites, alumina and aluminium in foreign countries.

195. Brazilian gamble. Mining Journal, Vol.286. No.7340. 23.Apr. 1976. pp. 321-323.

Known bauxite reserves are currently estimated at 1800 million tonnes. Production of nearly 7 million tonne/year in 1983, together with an alumina output of 2 million tonne/year and 921 300 tonne/year aluminium is expected. The most advanced of existing plans in the Brazilian bauxite reserves at Trombetas, in Para state.

196. CHABANIER, L.: Bauxite in Malaysia. Revue de l'Aluminium. No.440. May 1975. pp. 233-235.

Ramunia, the Malaysian corporation for bauxite mining will practically stop its production in the coming months, as the good quality deposits have been pestered out. The corporation delivered about 10% of the Japanese bauxite demands.

197. ERDELYI, T.; TAKÁCS, S.: Geological and industrial value of near surface clayey bauxites near Halimba, Hungary. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. Budapest. 1971. Vol.2. Res. Ins. Non-Ferrous Metals. pp. 169-183.

Open cast bauxite mining disclosed poor quality bauxites and clays in the surroundings of Halimba, providing possibility for detailed geological and physical investigations. The bauxites and clays were examined as raw material for the ceramic industry.

198. GUINARD, C.: Aluminium in Guinea. Revue de l'Aluminium, No.439. Apr. 1975. pp. 178-181.

The president of Guinea announced that an agreement on a 400 million dollar investment will be signed among Guinea and four Arab countries /Saudi Arabia, Kuwait, Lybia and Egypt/ for the exploitation of the bauxite deposits of Boké; the new group intends to mine about 9 millions of tons yearly.

199. GUINARD, Ch.: Evolution or revolution? Revue de l'Aluminium. No.444. Oct. 1975. pp. 429-435.

The locating of bauxite mining industries is monitored by Nature.

Perhaps it might be wise to emphasize that if Latin America accounted in 1973 for 42% of the bauxite production, it was Europe which, towards the end of the thirties, recorded this figure.

Ore exporting countries process locally a substantial proportion of the bauxite from their mining industry: Africa 39%, Latin America 48%, Australasia 73%. Between 1980 and 1985 the first alumina/aluminium complexes using nuclear power supply and new ores will make their appearance whilst the conventional plants will still continue to account for the major part of the capacity increase.

200. HUGUENEY, M.: Are the Philippines to become a producer country for alumina and aluminium? *Revue de l'Aluminium*, No. 444. Oct. 1975. pp. 438-439.

For some time it was known that on the island of Nonoc /Conico, Lutawon Peak/ there exist about 100 million tons of laterite containing in average 20-25%  $Al_2O_3$ , 25-40%  $Fe_2O_3$  and 2-3%  $SiO_2$ . Recent prospects at the island of Samar, especially in the region of Leyte, revealed the existence of additional 100 million tons of good quality bauxite, with a 50%  $Al_2O_3$  and 1-2%  $SiO_2$  content.

201. HUGUENEY, M.: Birth of an aluminium industry in Turkey. *Revue de l'Aluminium*. No.450. Apr.1976. pp. 166-167.

According to recent estimates, Turkey's bauxite reserves attain 40-50 million tons /Mt/, notwithstanding the diasporite deposits valued at 67 million tons /of which 40 million tons are to be found in the region of Milas/. The site of the main bauxite deposits are between Konya and Antalya, in the Western part of the Taurus mountains /region of Seydisehir and Akseki/, and in the region of Zonguldak at the Black Sea coast.

202. HUGUENEY, M.: Negotiations about Surinam bauxite. *Revue de l'Aluminium*. No.438. March 1975. pp. 139-140.

According to estimates of the World Bank made in January 1972, the bauxite resources of Surinam amount to about 600 million tons, thus constituting one-twentieth part of the world's entire resources estimated to exceed 12 milliards of tons. At the end of last year it was rumoured that the government will start negotiations with Billiton, the corporation possessing already 35% of the country's bauxite production.

203. HUGUENEY, M.: The position of North-American producers in Jamaica. *Revue de l'Aluminium*. No.462. May 1977. pp. 217-219.

The first stage of negotiations among Jamaica and six North-American aluminium-producers was abruptly cut-off in May 1974, due to a



unilateral decision of Jamaica to impose a royalty on bauxite six-times higher than earlier, and to be tied to the price of aluminium. In the follow-up the Jamaican government called-in a second round of negotiations with the intention to repurchase its bauxite-fields from the said producers and to ensure its participation in the bauxite and alumina plant installations on their island.

204. HUGUENEY, M.: Production of bauxite, alumina and aluminium in Australia. *Revue de l'Aluminium*. No.452. Jun. 1976. pp. 278-291.

Australia, together with Guinea, are in possession of the world's greatest bauxite deposits. Australia's three most important deposits amount to at least 3,5 milliards of tons of commercially exploitable bauxite, from the total world deposits' estimated to about 15 milliard tons.

205. HUGUENEY, M.: Towards the development of the bauxite deposits of the Solomon Islands. *Revue de l'Aluminium*. No.448. Feb. 1976. pp. 60-61.

An account is given of developments which should result in the exploitation by Mitsui and RTZ of the deposits on the islands Rennell and Wagina, where bauxite reserves are estimated at 50 M tons. An alumina works with a capacity of 600 000 tone/year would be built, probably on the island of Rennell. The government of the Solomon Islands is very much in favor of the scheme which would raise the very low standard of living of the population.

206. HUGHES, I.G. et alii: The mineral resources of Jamaica. *Bulletin of Geological Survey, Department, Jamaica*. Vol.8. 1973. pp. 1-88.

A review includes descriptions of deposits of bauxite, Cu, Fe, Mn, limestone, dolomite and others, with many chemical analyses.

207. The implications for the aluminium industry of the changes in supply conditions of bauxite. *Revue de l'Aluminium*. No.455. Oct. 1976. pp.435-438.

World reserves of bauxite are considered to be adequate to meet demand in the next half century. Increases in the price of some bauxite have accelerated research into alternative processes for producing alumina from non-bauxite materials. Subject to cost there could be a gradual change in some countries to the use of non-bauxite materials.

208. KOVÁCS, P.: Bauxite in San Domingo. *Revue de l'Aluminium*. No.445. Nov. 1975. pp. 481-483.

ALCOA is operating an open-air bauxite mine in Cabo Rojo: its production is about 1 million ton bauxite yearly, having an alumina-content

of 45-48%. Due to the recession in the United States, in the present year ALCOA's production will not attain more than 750 000 tons. Besides, the Dominican government has decided to raise the royalty-fees to be paid by foreign companies extracting bauxite.

209. Less from Jamaica. Mining Journal. Vol.287. No. 7358. 27.Aug. 1976. p. 158.

This year production of Jamaican bauxite could be over 1 million tonnes less than 1974 output.

210. LINDBERG, G.: Trends in aluminium manufacture. Pt.1. To what extent exist the raw materials? Kemisk Tidskrift. Vol.88. No.9. 1976. pp.30-33.

A review based on the Dept of State Geol. Survey Bull. No.1228, Bauxite Reserves and Potential Aluminium Resources of the World, 1967.

211. NIA, R.: Genesis of boehmite and diasporite in Greek upper Cretaceous bauxites of the Parnassos-Klona zone. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct.6-10. 1969. Budapest, 1971. Vol.2. Res. Ins. Non-Ferrous Metals. pp. 69-98.

212. RAO, D.: A review of the bauxite resources for the Gujarat alumina project. Mineral Wealth. Vol.11. No.1. 1975. pp. 1-6.

Reserves are estimated to be 18,7 million tons of bauxite containing  $Al_2O_3$  53%.

213. TRUBELJA, F.: Two different bauxite types in the area of Jajce, Bosnia. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest, 1971. Vol.2. Res. Ins. Non-Ferrous Metals. pp. 53-62.

Two types of bauxite can be distinguished concerning the age of the hanging wall and mineral composition. The two types of bauxite different in mineralogy are products of different geological environments.

214. VALETON, I.: Bauxites. Amsterdam-London. 1972. Elsevier Publishing Co. p.226.

Distribution of bauxite deposits. p.3.

215. World aluminium survey. Richmond, Surrey. 1977. Metal Bulletin Ltd.

Experts of trend-studies are envisaging in the first part of the survey - based on previous discussions with leading industrialists and marketing managers - the possible development for the coming 5 years of the following sectors: bauxite, alumina, primary aluminium, refining, manufacture of semi-products, change in stocks, international commerce, research. The second part gives informations on company-activities, their capacity and the plants of the main sectors of the aluminium industry.

## 5. MINING AND BENEFICIATION OF BAUXITE

216. APANASEVA, R.P.; RYBAKOV, V.V.: Concentration of low-grade bauxites. Trudy Vsesajuznogo Nauchno Issledovatel'skogo Proekt. Int.Meh.Obrabotki Polezn. Iskopaemih. No.139. 1974. pp. 13-18.

217. Alumina-containing ores treatment prior to alkaline extraction of the alumina. Tatabányai Szénbányák. No.1, 341, 609 /20. May 1970//British Patent/

218. Aluminum minerals purification from iron by sulfiding with  $\text{SO}_2$  and CO and then chlorinating. Comalco Aluminium Ltd. No. 2516, 735 /17 Apr. 1974.//German Patent/

Iron-containing Al minerals, such as bauxite, are purified from Fe contaminants by reacting, preferably after dehydration at less than 750 C, with a gas mixture containing 20-40 vol %  $\text{SO}_2$ , balance CO and small amounts of diluent impurities, at 450 to 750 C to convert Fe to iron sulfide, and heating with Cl, preferably at 430 to 750 C, to form and volatilize  $\text{FeCl}_3$ .

219. ANDREJEV, P.I. et alii: The enrichment of bauxite with the aid of heterotrophic bacteria. Light Metall Age, Vol.34. No.3/4. 1976. pp. 5-6.

Russian developments at the Institute of Mineral Resources still in the research stage, on the use of bacterial strains to digest silicate minerals are described. The work is directed toward enrichment of Russian ore reserves of low-grade, high-silica bauxite, which without enrichment cannot be processed into alumina by the Bayer method. Results indicate effectiveness of bacterial enrichment of bauxites and of other aluminosilicates.

220. ANISČENKO, N.M.: Beneficiation of chamosite-gibbsite bauxites in the Belenikhinsk deposit of the Kursk magnetic anomaly. Obogascenie. Polez. Iskop. No.12. 1970. pp. 16-19.

Ores contain: 53,7 gibbsite, 27,1 chamosite, 8,5 halloysite, 3,6 siderite, 1,3 quartz, 1,9 anatase, 1,2 pyrite, 2,6 iron-hydroxides and 8,4  $\text{SiO}_2$ , 1,8  $\text{TiO}_2$ , 49,2  $\text{Al}_2\text{O}_3$ , 0,6  $\text{Fe}_2\text{O}_3$ , 12,1 FeO and 0,4% S.  $\text{Al}_2\text{O}_3$  is predominantly concentrated in the more coarse + 0,03-0,4 mm fractions and halloysite and chamosite in the finely crushed fractions. Scrubbing and flotation methods, as well as dry and wet magnetic separation, were studied in detail.

221. ANSARI, M.I.; JENA, P.K.: Beneficiation of low-grade bauxite ores from Orissa. Journal of Mines, Metals and Fuels. Vol.22. No.12. 1974. pp.395-397., 408.

Ferruginous ore of Pottagi area in Koraput district /Orissa/ containing 52%  $Al_2O_3$  is crushed, ground to +100 mesh size and washed to remove about 1/3 of the total Fe and upgrade the  $Al_2O_3$  content to 57%, suitable for Al reduction.

222. BABIČEV, N.I. et alii: Study of the effect of surfactants on the disintegration of high-alumina ores. Izvestija Vyssih Učebnyh Zavedenij, Geologija i Razvedka. Vol.19. No.2. 1976. pp. 132-135.

Organic surfactants /isooctylphenyl polyethylene glycol ethers, mixtures of monohydric pyran alcohols and alkylarenesulfonates/ improved the disintegration of the ores at high peripheral speeds of the propeller /about 10 m/sec/ and at low consumption of the surfactants /less than 1 kg/ton/.

223. BOULANGE, B. et alii: The role of clay in the migration and accumulation of alumina in some tropical bauxites. Comptes Rendus, Académie des Sciences de Paris, Ser.D. Vol. 280 D. 21.May 1975. pp. 2183-2186. /French/

In tropical bauxites, alumina originates in the first place from the weathering of minerals in the parent rock. These bauxites can subsequently become enriched in alumina by desilification of kaolinite deposits occurring in voids and cracks. This alumina crystallizes in situ as secondary gibbsite by relative accumulation.

224. BRUCY, J.; AUVERT, R.: The Mazauges-Aval mining works-sinking of an incline. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol.2. Res.Ins. Non-Ferrous Metals. pp. 187-196.

The incline at Mazauges-Aval which has a section of 15 m<sup>2</sup> a length of 1080 m and a gradient of 16°35', was sunk in aquiferous limestone strata separated by an impermeable marly-sand layer. The originality of the sinking method resides in the use of a removable suspended conveyor allowing the permanent conveyor to be used and extended while sinking operations are still in progress.

225. CSÓKE, B. et alii: Concerning the problem of dressing Hungarian bauxites. Freiburger Forschungshefte. Vol. A544. 1975. pp. 167-187. /German/

The use of such methods as electron microprobe and sink float analysis of different size fractions for evaluating the suitability of various methods of dressing bauxite is discussed.

226. CSÓKE, B.: Economics of improved bauxite quality. Bányászati és Kohászati Lapok, Bányászat. Vol.107. No.12. 1974. 10 p. /Hungarian/

Previously abstracted from original as item 7511-21-0042. By pretreat-

ment of the bauxite ore of Halimba /by separating the fraction +1 mm of the crushed ore at specific gravity 2,9 g/ou cm or subjecting the powdered ore to the hydrocyclone treatment/, 50% of the CaO and 30% of the MgO can be removed. The  $Al_2O_3/SiO_2$  ratio of bauxites can be economically improved.

227. Decomposition of goethite contained in bauxite. Aluterv Aluminiumipari Tervező Vállalat and Fémipari Kutató Intézet. No. 2, 335, 732 /14 July 1972/. /German Patent/

The  $Al_2O_3$  and  $V_2O_5$  bound by the goethite are dissolved and the goethite is converted into hematite at 220 to 280 C with an aluminate liquor containing 100-300 g  $Na_2O_k$  /- Na content in the form of NaOH bond to Al/ /l, the decomposition is effected in the presence of 1-6 wt % CaO /calculated on the dry bauxite/ and of 0,5-12 wt % NaCl.

228. DERDACKA, A. et alii: Possibilities of enrichment of fly ash from Turossow with aluminium oxide. Cement, Wapno, Gips. Vol. 29. No.7.1975. pp. 206-209. /Polish/

The Turossow fly ash contains a large amount of  $Al_2O_3$  and lesser amounts of  $Fe_2O_3$  and  $SiO_2$ . It is shown that the variation of  $Al_2O_3$  content in fly ash influences the basic operating data for  $Al_2O_3$  and cement production by the J. Grzymek method.

229. DOWSING, R.J.: Aluminium: /I.-/ Second only to steel in worldwide engineering use. Metals and Materials. Jan. 1977. pp. 20-26. /English/

The production of Al from bauxite is considered up to the alumina powder stage. The occurrence and preparation of Al ores are discussed, and processes for the beneficiation of the ore are described. These involve primary and coarse crushing and grinding, followed by washing and drying, and subsequent reduction of the bauxite to pure  $Al_2O_3$  by means of the Bayer process.

230. B/MJ. International directory of mining and mineral processing operations. New York. 1976. Mining Information Service, Engineering and Mining Journal, 220 pp.

Company data - headquarters listings. United States mine - Plant Unite. Canadian mine - plant units. International mine. Consultants, plants designers, contractors. Ore buyer guide. Federal/State mine bureaus and geological surveys.

231. Enriching bauxite or other ores. Fémipari Kutató Intézet. No. 2, 456, 104 /29 Nov. 1973//German patent/

Bauxite or other oxide, silicate, sulfate, sulfide or carbonate ores are enriched by selective agglomeration and flotation and/or sedimen-

tation by addition of short-chained prepolymer or precondensate flocculants to suspension.

232. FEDYAEV, E.F. et alii: Gravitation-magnetic beneficiation of bauxites. Naučno Tehničeskaja Konferencija Uralskogo Politehničeskogo Instituta. No.1. 1972, 1973. pp. 11-12. /Russian/

A combined gravitation-magnetic method is proposed for beneficiation of gibbsite-type bauxites of Krasnyy Oktyabr and Belinsk deposits. Basic operations are: washing, classification and magnetic separation in a strong field. The magnetic separation in a strong field was studied on a continuous flow polygradient separator.

233. GAMI, A.F. et alii: Mechanical and chemical enriching of nepheline-containing ores. Sprechsaal für Keramik, Glas Baustoffe, Vol.108. No.17-18. pp. 493-494., 496., 498., 500. /German/

Mechanical beneficiation of nepheline-containing minerals was unsuccessful. Iron was removed by treatment with HCl at variable high temperatures. High-pressure treatment at 240 C in the presence of excess alkali was successfully attempted.

234. GOUT, R.: The effect of mechanical action on diasporite. Comptes Rendus, Académie des Sciences de Paris, Ser. D. Vol. 282D. No.10. 8.Nov. 1976. pp. 945-948. /French/

The grinding of diasporite leads to the formation of a poorly crystalline variety which loses water at a lower temperature. This variety has been observed in some bauxite deposits. A higher degree of grinding leads to the formation of a compound which is amorphous to X-rays, and then to a corundum with a crystal lattice greatly expanded by imperfections.

235. GOUT, R.: Kinetics of extraction by hydrochloric acid of the iron oxides contained in bauxites. In: ICSOBA Third International Congress. Nice. 1973. pp. 383-388. /French/

The dissolution of iron oxides and hydroxides in bauxites by HCl resulted in boehmite with low Fe content. The fine grain size of the hematite and the crystal structure are factors resulting in a rate of dissolution favorable for industrial applications.

236. High organic carbon content bauxite treatment. Mitsui Mining and Smelting Co. Ltd. No. 1383, 136 /7 Mar. 1973/ /British patent/

Process comprises calcining gibbsite bauxite containing iron oxide in goethite form in an amount of 10-25 wt % /calculated as  $Fe_2O_3$ / at 250 to 600 C to reduce the amount of water of crystallization.

237. HO U YON: Studies on Leaching of Bauxite Sinter. Pt.1. Kwahagwon Tongbo, No.5. 1972. pp. 35-40. /Korean/

Characteristics are given for bauxite sinter produced in Korea. The composition of the sinter is different than the usual bauxite species in that it has higher  $\text{SiO}_2$  content and lower Fe. The sinter contains a large amount of calcium or thosilicate, has high strength, but low porosity.

238. HOLLIDAY, D. et alii: Experimental evaluation of Routes for purification of bauxite by gas-solid reactions. Industrial and Engineering Chemistry Product Research and Development. Vol.14. No.4. Oct. 1975. pp. 447-452.

Conditions for preparation of  $\text{AlCl}_3$  of low Fe content were studied in a thermogravimetric apparatus designed so that sensitive components were shielded from the gaseous reagents. Reaction of natural bauxite pisolites of diameters between 1,5 and 12 mm with gaseous reagents based on  $\text{SO}_2$ -CO, HCl-CO, HCl,  $\text{H}_2\text{S-Cl}_2$ ,  $\text{S}_2\text{Cl}_2$ -CO,  $\text{SO}_2$ - $\text{Cl}_2$  and CO- $\text{Cl}_2$  was analyzed. Predictions that  $\text{SO}_2$ -CO mixtures of high S potential would be particularly suitable for preparation of FeS were confirmed. Maximum sulfidization rates occurred at the  $\text{SO}_2$ /CO ratio of 35:65.

239. HÖRISZT, G.: Hydrogeology of the Nyírád bauxite region and the results of active water protection. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest, 1971. Vol.2. Des.Ins. Non-Ferrous Metals. pp. 99-112.

The bauxite district Nyírád is the most water hazardous bauxite deposit in Hungary. About 85 percent of the area, i.e. an area of some  $300 \text{ km}^2$ , is made up of karstic or other water bearing rocks. About 80 percent of the bauxite reserve lies below the piezometric level of the Triassic Karstic water system.

240. IŠČENKO, V.V.: Flotation of silica from bauxites. Izvestija Vyssih Učebnyh Zavedenij, Cvetnaja Metallurgija. No.3. 1974. pp. 7-11. /Russian/

A study was made on the feasibility of removing silica from bauxite ores by the cationic flotation method. The original material contained 45,45%  $\text{Al}_2\text{O}_3$ , 10,2%  $\text{SiO}_2$ , 16,75%  $\text{Fe}_2\text{O}_3$ , 2,5%  $\text{CO}_2$  and 1,15%  $\text{TiO}_2$ . Primary amines / $\text{C}_{12}$ / were used as flotation agents.

241. KAKASY, Gy.: Decreasing the silica content of Halimba bauxites. Bányászati és Kohászati Lapok, Bányászat. Vol.108. No.1. 1975. pp. K31-K36. /Hungarian/

By soaking crushed undried Hungarian boehmite-containing bauxites occurring at Halimba in a peptizing agent /a 0,3-0,5% aqueous solution of  $\text{Na}_4\text{P}_2\text{O}_7 \cdot 10\text{H}_2\text{O}$ / in a slurry of pH about 6, most of the kaolinite can be removed and thus the quality of bauxite ore can be improved to a great extent.

242. KIS, I.: Protection against karst water in the Bakony bauxite mines. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol.2. Res.Ins.Non-Ferrous Metals. pp. 219-226.

The so-called active method of dewatering is discussed. The geological, hydrological and mining conditions are dealt with, and the development of the method is described. A comparison is made between the problems raised by the passive /traditional/ method of dewatering and by the active one.

243. LAWVER, J.E. et alii: Production of anorthosite concentrate from Minnesota copper-nickel flotation tailings by high gradient magnetic separation. In: World Mining and Metals Technology. New York. 1976. Vol. 2. Mining and Metallurgical Society of Japan and AIME. pp. 929-942.

Flotation tailings containing 19%  $Al_2O_3$  and 8,3%  $Fe_2O_3$  from the beneficiation of Cu-Ni ore have been treated by high-gradient magnetic separation to produce an anorthosite concentrate assaying more than 28%  $Al_2O_3$  for possible domestic use in producing alumina. A continuous high-gradient magnetic separator with a carousel design has been developed to process the tailing at high volumes.

244. LEVIN, J.; OVERBECK, P.W.: The heavy-medium cyclone concentration plant for the treatment of andalusite sands on the farm 'Wonderfontein'. Johannesburg. South Africa. 1976. National Institute for Metallurgy. 4 pp. /NIM Rep. No.1281/

The operation of the heavy-medium cyclone concentrator is described. Stable operating conditions are not obtained because the design of the concentrator does not allow for control of the operating variables. Float material at a specific gravity of 2,95 constituted 2,0% of the concentrates produced, which assayed 52,8%  $Al_2O_3$  and 1,75%  $Fe_2O_3$ .

245. LEVIN, J.; OVERBECK, P.W.: Summary of work done on the concentration of andalusite from deposits in the Western Transvaal. Johannesburg, South Africa. 1976. National Institute for Metallurgy. 39 p. /NIM Rep. No. 1779./

The efficiency of various methods of andalusite concentration was investigated. Heavy-medium separation /HMS/ was found to be the only practical method of concentration. A standard method, which includes the use of washability curves and the Tromp efficiency curve, was developed for assessment of the ores and their amenability to HMS.

246. LEWOWICKI, S. et alii: Properties of bauxites from the Lublin district and results of their enrichment testing. Materialy Ognitrowale. Vol.25. No.3. 1973. pp. 60-64. /Polish/

The bauxites can be used to produce aluminium oxides and the rust-inhibitor paints. In the bauxites treated with 40% HCl for 30 min at



80 C the  $Al_2O_3$  concentration increased from 43,39 to 53,04%. Enrichment by screening, in a heavy liquid and in an electromagnetic separator, did remove some of the Fe; however, much less Fe was removed by these methods than with 40% HCl.

247. LYUSNIYA, L.M. et alii: Beneficiation of low-grade Ukrainian bauxites. Obogašćenje Bednyk Rud. 1973. pp. 101-104. /Russian/

Low-grade bauxites /especially Vysokopolski and Yuzhno-Nikopolski deposits/ were treated by washing, jigging, magnetic separation and flotation. Washing had only a slight effect on the chemical composition of the ore. Magnetic separation with a AES-1 type separator in a 7000 Oe or less magnetic field yielded a product containing 45,6%  $Al_2O_3$  and 9,2%  $SiO_2$  with a 66,9% yield of the initial ore.

248. LYUSNIYA, L.M. et alii: Role of salts in hard water during the flotation of alunitic ores. Trudy Instituta Mineralnyh Rešursov Akademii Nauk Ukrainskoj RSR. No.5. 1971. pp. 110-116. /Russian/

In a neutral medium, the salts in hard water activated only the flotation of alunite and had practically no effect on the flotability of quartz and opal; however, in an alkaline medium, pH 9,8, they strongly activated the flotation of quartz and alunite.

249. LYUSNIYA, L.M. et alii: Beneficiation of unconditioned Ukrainian bauxites. Obogašćenje Polezny Iskopaemyh. Vol.13. 1973. pp. 3-9. /Russian/

Technological conditions were established for beneficiation of two types of bauxites containing  $SiO_2$  8,5 and 9,5,  $Al_2O_3$  38,5 and 32,1,  $Fe_2O_3$  25,5 and 36,8,  $TiO_2$  1,7 and 1,6 and CaO 1,7 and 0,2% respectively. The ores were composed mainly of gibbsite, boehmite, hematite, limonite, kaolinite, ilmenite and calcite.

250. LOGOMERAC, V.G.: Obtaining titanium, minor and rare earth elements by solvent extraction, during complex processing of high-silica bauxite. In: ICSOBA Third International Congress, Nice, 1973. pp. 605-611.

The continuous research for developing economical technologies for processing high-silica bauxites led to a complex process suitable for the exploitation of almost all ingredients in this bauxite. This process consists in the smelting of bauxite burden, enriched with the sintered or pelletized material with high Fe content in an electric furnace, and production of an alloy or pig iron and the slag.

251. LYEW-AYEE, P.A.; MANULA, Ch.B.: An application of mathematical programming and systems simulation to bauxite mining operations in Jamaica. New York. 1974. Metallurgical Society of AIME. 15 pp. /TMS Paper No. A74-76./

Because of the nature of the bauxite ore bodies in Jamaica, plus the

quality control and production demands dictated by the alumina plants, production schedules have to be made for each set of pits that are to be mined simultaneously. A two-part model was developed.

252. MECSNÓBER, M.; ROSTA, F.: Experiences of shaft sinking by drilling in Hungarian bauxite mining. In: Proc II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest, 1971. Vol.2. Res. Ine. Non-Ferrous Metals. pp. 211-218.

Experience has shown the drilling technology developed for the complicated geological formations of Izama major territory to be acceptable. Up to the first half of 1969, 11 shafts have been drilled, the greatest depth being 251,2 m. Technology is, however, far from satisfactory and there are numerous possibilities of improvement as regards drilling rates, economy and safety of operation.

253. Method of beneficiating alumina-silica ores. Ethyl Corp. No. 3,860,514 /24 Nov. 1972./ Official Gazette, 14 Jan. 1975. /U.S. Patent/

A method of beneficiating aluminous clay containing iron oxides to effectively lower the content of the iron oxides in the clay.

254. Method of processing aluminum-containing ores. Vereinigte Aluminium Werke AG. No. 3,816,605 /29 Apr. 1971/ U.S. patent/ Official Gazette, 11 June 1974. See WAA 7303-21-0007P /German 2,121,094/

255. Method of treating bauxite. Mitsui Kinzoku Kogyo Co., Ltd. /27 Sept. 1971/ No. 7,339,317. /Japanese patent/

256. MILNE, D.J.; HOLLIDAY, R.D.: Thermodynamics of gas-solid reactions for purification of bauxite at moderate temperatures. Industrial and Engineering Chemistry Process Design and Development. Vol.14. No.4. 1975. pp. 442-447.

Removal of Fe to low residual levels is essential in preparation of  $AlCl_3$  feed for chloride electrolysis cells for Al production. The number and complexity of systems affording possibilities for beneficiation of bauxite by gas-solid reaction is such that computer techniques are needed to analyze them in an ordered way. Predominance area diagrams have been used in conjunction with free energy minimization calculations to define routes for selective removal of Fe.

257. NURMAGAMBETOV, H.N.: Beneficiation of bauxites. Metallovedenie i Termičeskaja Obrabotka Metallov. Vol.3. 1974. pp. 175-176. /Russian/

High  $Al_2O_3$  yields were obtained in laboratory tests by washing the bauxite and its bottom product on different sized screens and by desliming. The three products /a Bayer product rich in Fe, a product identical with the original bauxite and a clayey product with little Fe but rich in kaolinite/ were leached with sodium aluminate solu-

tions at a specified temperature and time on the basis of the amount of  $\text{SiO}_2$ . The sediment of the second product and the third product were combined, sintered and leached.

258. OVERBECK, P.W.: A summary of work done on the concentration of andalusite from deposits in the Western Transvaal. National Institute of Metals Republic South Africa. 1976. 39 pp.

Concentration of ores containing 4-50% andalusite was investigated. Heavy-media separation in a cone or cyclone separator was the most practical method. The concentration degree increased and the recovery decreased with increasing specific gravity of the separating medium.

259. PASTUHOVA, M.V. et alii: Photolytic method for the removal of free iron oxides from bauxites and other rocks. *Litologija i Poleznye Iskopaenye*. No.2. 1973. pp. 86-99. /Russian/

The photolytic method for iron oxide removal from rocks after their treatment with  $\text{NH}_4\text{HC}_2\text{O}_4$  /Tamm agent/ at pH 3,25 was studied. A Hg-quartz lamp of 375 W was used. More than 60 samples of bauxites, predominantly of gibbsite type, were examined. Iron oxide separation occurs without destroying the Al mineral structure.

260. PLYGUNOV, A.S. et alii: Reduction of iron/III/ sulfate to iron/II/ iron chips. *Himijska i Tehnologija*, Kiev. No.4. 1976. pp. 60-61. /Russian/

In the removal of Fe from bauxite, it is desired to reduce  $\text{Fe}^{3+}$  to  $\text{Fe}^{2+}$  which has a more soluble hydroxide. The use of powdered Fe for this purpose was studied by determination of the rate and activation energy of the reaction. The rate was first order, activation energy 8,6 kcal/mole and more complete at 100 C with 75 g  $\text{H}_2\text{SO}_4$ /l present.

261. POHL, K.: Bauxite mining in Hungary. Some technical developments and results. *Magyar Aluminium*. Vol.12. No.3-4. Mar.-Apr. 1975. pp. 93-96. /English-Russian/

Only 15% of Hungarian bauxite production is provided by open-pit mines. Underground bauxite is soft, mostly boehmitic, and rather sticky when wet. It gets soaked and becomes pulpy on the underside of drifts; dewatering properties of this pulpy mud are poor. The use of heavy machinery in the underground operations is therefore restricted.

262. Processing titaniferous iron ores for the recovery of aluminum, chromium, iron, titanium and vanadium. Centre Recherche Industrielle Quebec. No. 3,856,512 /27 Apr. 1973/ /U.S. patent/ Official Gazette, 24 Dec. 1974.

A process for treating titaniferous iron ore or concentrate having a total Fe content of at least 40% and a  $\text{TiO}_2$  content of less than 25%.

263. PRYOR, E.J.: Mineral processing. Third edition. Amsterdam-London. 1965. Elsevier Publishing Co.Ltd. 824 pp.

264. RATOBLJSKAJA, L.D.: Selective flotation of nepheline from apatite-nepheline ores. *Himičeskoe Promyšlennost'*. No.10. 1975. pp. 770-772. /Russian/

The specific properties of nepheline in the presence of  $\text{Na}_2\text{SiF}_6$  /5-7 kg/ton/ were exploited by selective flotation with a cation-active collector. Due to the initial hydrolysis of  $\text{Na}_2\text{SiF}_6$  the pH is 5,0-5,5 and selective flotation of nepheline /both from Ti minerals and from feldspars/ is favored.

265. Recovery of phosphorus from phosphorus-containing bauxite. Mitsui Mining and Smelting Co.Ltd. No. 7,308,694 /14 June 1971/ /Japanese patent/

NaOH extracts of P-containing bauxite were treated with  $\text{Ca}/\text{OH}/_2$  to recover P compounds from the bauxite. Thus, 100 g bauxite containing  $\text{Al}_2\text{O}_3$  49,65,  $\text{Fe}_2\text{O}_3$  14,50 and  $\text{P}_2\text{O}_5$  2,5% was extracted with 650 ml of an aqueous solution containing 170 g/l NaOH and 60 g/l  $\text{Al}_2\text{O}_3$ , filtered to remove a red precipitate, the filtrate was stirred with 6 g  $\text{Ca}/\text{OH}/_2$  60 min at 100 C to give 9 g  $\text{Ca}_3/\text{PO}_4/_2$  /99% P removal/.

266. Red mud separation from aluminum containing ore using titanium oxides. Sumitomo Chemical Co. Ltd. No. 74 102,097 /7 Apr. 1972/. /Japanese patent/

An ore containing Al was dissolved in alkaline and aqueous solution of high molecular synthetic compound to precipitate it; after extraction of the ore the separation of red mud suspension in aluminate solution was affected in the presence of over 6 wt %  $\text{TiO}$  or  $\text{TiO}_2$ .

267. Removing calcium and sulfur from bauxite. Mineral Ore Research Institute. No. 470,497 /12 Mar. 1973./ /Soviet patent/

Bauxite slurry is treated with ion-exchange resin using 0,3-0,7 /preferably 0,5/ by wt resin, and the solid: liquid ratio is 1:5. The ionite can be the Na form of a cationite, for example, KU-2, or a mixture of cationite and anionite, such as KU-2 and AN-2P.

268. Roasting bauxite for removal of organic matters. Mitsui Mining and Smelting Co. Ltd. No. 7,339,317 /27 Sept. 1971/. /Japanese patent/

Bauxite of average granule size 0,5 mm or over is fluidised-bed roasted at 300 to 600 C with an average residence time 15-120 min. The fluidised bed roasting improves the contacting between fluidizing medium and suspended bauxite particles and can efficiently decompose and remove organic matter in the raw bauxite for production of alumina.

269. SALATIC, D. et alii: Electrokinetic phenomena in interfaces and valorization of high-silica bauxites. In: ICSOBA Third International Congress. Nice. 1973. pp. 389-397.

Yugoslavia possesses a great number of deposits of karst-type low-grade bauxite ores with high SiO<sub>2</sub> content. Currently, the deposits are not exploited due to the unsolved problem of their concentration for further processing. For that reason, intense studies are being carried out on the possibility of their concentration by various mineral dressing methods.

270. SCHAER, J.P.: Optical sorting of bauxite. In: ICSOBA Third International Congress. Nice. 1973. pp. 467-476. /French/

Experiments were conducted to evaluate optical sorting of bauxite minerals. After crushing, the material was separated into fines less than 50 mm and particles 50 to 200 mm. Reflected light from the particles was analyzed as to intensity. Photoelectric cells and electronic circuits were used to separate the dense particles. A modification of the system to analyze the reflected spectra separated red particles. However, economic results were not outstanding compared to manual sorting.

271. SKINNER'S, W.B.: Mining international year book. 1976. London. 1976. The Financial Times Limited. 675 pp.

World mining and maps. World production tables. Kindred companies.

272. ŠMORGUNENKO, N.S.: Complex processing of nephelines. Bányászati és Kohászati Lapok, Bányászat. Vol.107. No.12. 1974. pp. 570-574. /Hungarian/

A review is given on the processes developed in Russia for the manufacture of alumina, cement and soda from nepheline and nepheline-syenite rocks, including the Manvelian chemical enrichment process, the Ponomarev hydrochemical process and the Smirnov process for nephelines rich in alkali.

273. STOCES, B.: Introduction to mining. Vol.1.- text. London-New York-Paris. 1958. Pergamon Press. 711 pp.

Geology and mining. Prospecting and exploration. Boring. Excavation. Explosives, their transport, storing and use. Support of mine workings. Transport in the mine. Underground prospecting and exploration. Opening up of the deposit, its development and preparation for mining, dividing up the deposit.

274. SOLYMÁR, K. et alii: Beneficiation of bauxites rich in iron. In: ICSOBA Third International Congress. Nice. 1973. pp. 453-465. /French/

Improvement in the quality and at the same time increased value of

bauxites is possible through reduction in  $Fe_2O_3$  content. A method investigated involves powdering the ores and magnetically separating the Fe-bearing fractions. The separated concentrate had an  $Fe_2O_3$  content of 70%. The fine fraction remaining contained as high as 88%  $Al_2O_3$ . The enrichment seems economically feasible and is being tested on high Fe Yugoslav bauxites.

275. SOLYMOS, M.: Effects of water-level sinking on bauxite production planning. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol. 2. Res. Ins. Non-Ferrous Metals. pp. 227-230.

Hungary's bauxite occurrences are situated below karstic water level. To fight the water hazard in operational areas a scheme of active water protection has been devised. Under the scheme dynamic water is lifted and karst water level is sunk in a given proportion.

276. SPASIC, N.: Results of a mass blasting method in the open-cast mining of the ferrous bauxite deposit Grebnik, in Metohija, Yugoslavia. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol. 2. Res. Ins. Non-Ferrous Metals, pp. 231-238.

The introduction of the portable drill rigs of the Swedish Atlas Copco Factory made it possible to use more efficient methods in drilling and blasting ferrous bauxite. The BVB-14 drill rig, the selection of the best suited crown, spaced charges in sizes determined by test shootings and small-delay detonators ensured not only favourable conditions for drilling but also a satisfactory fragmentation of the rock.

277. STAUDINGER, J.: Some problems of technology in underground bauxite mining. Proc. II. International Symposium of ICSOBA. Budapest. Oct. 6-10. 1969. Budapest. 1971. Vol. 2. Res. Ins. Non-Ferrous Metals. pp. 253-261.

The relatively small bauxite bodies and lenses do not permit to realise underground mines with shaft outputs of 5 to 10 million t/yr, considered most economical in several branches of mining. But it is not impossible to attain a similar level of technical maturity comparable in terms of specific face capacity, and even to surpass it by increasing the working face height.

278. TARJAN, G.; CSOKE, B.: Experiments to reduce the carbonate content of Halimba bauxites. *Bányászati és Kohászati Lapok. Bányászat.* Vol. 108. No. 3. 1975. pp. 157-163. /Hungarian/

The bauxite minerals and the  $SiO_2$  bearing minerals are closely associated when still undecomposed and carbonates are enriched in the fractions of coarser grain size. Thus, the CaO-content of bauxites /calcite-dolomite content/ can be efficiently decreased by simple physical-mechanical treatment /separation according to specific gravity hydrocyclone treatment after disintegration and grinding/.

279. THIRUMALAI, K.: Single fracture and fragmentation of brittle solids subjected to thermal shock. In: International Symposium on Defect Interactions in Solid. Bangalore. 1974. pp. 27-35. /Indian Institute of Science/.

A new technique of inducing crushing of rocks and related brittle solids by a single fracture process using thermal shock principles has been developed. The feasibility of controlled single fracture thermal crushing of brittle solids in which the end product size reduction is directly obtained by single event crushing is examined. An analysis is made to determine the state of thermal stresses and fragmentation induced by surface heating of brittle solids.

280. TOLNAY, K.: Designing and technology of big holes drilled for water in hard rocks. In: Proc. II. International Symposium of ICSOBA. Budapest. Oct.6-10. 1969. Budapest. 1971. Vol.2. Res.Ins. Non-Ferrous Metals. pp. 197-209.

Analyzing the problems of planning wells for draining the bauxite reserves lying below the karst water table in the Bakony Mountains area, the author describes the methods of hydraulic designing, examines the most favourable well size and constructions and the hydrostatic and overburden pressures acting on the casing and filter pipes.

281. Use of high-iron siderite-containing bauxite in the production of alumina. Trudy Instituta Metallov i Obogashcheniya Akademii Nauk Kazahskoj SSR. Vol.50. 1975. pp. 8-12. /Russian/

Magnetic annealing of bauxite is a useful conditioning method since it decreases the amount of ore that must be transported by 20 to 5%. The optimum annealing temperature is 600 C. The annealed bauxite specimens contained gamma- $Al_2O_3$ , the amount depending on the particle size of the material. Curves show the  $CO_2$  and S contents of annealed bauxite as a function of annealing temperature and the relative refinement of bauxites from different areas. The magnetic fraction can be separated at the crushing unit.

282. WARGALLA, G.: The wet-milling of bauxite. Erzmetall, Vol.28. No.7-8. Jul./Aug. 1975. pp. 336-337. /German/

Several years' experience has shown that the newly developed grinding plates lead to considerably less wear and thus to a marked cost saving in the milling of bauxite. Through the use of curved sieves it is possible to operate the present through-flow milling system more economically by connection as a cyclic milling system.

283. KURKOVA, Z.A. et alii: Characteristics of thermochemical conditioning of Northern Oneshsky bauxites. Izvestija Vysših Učebnyh Zavedenij, Ovetnaja Metallurgija. No.2. 1976. pp. 59-62. /Russian/

Chemical enrichment of high silicate bauxites was studied. Hydrargillite-boehmite bauxites from the Northern Oneshsky region were leached with alkali solutions and processed into high-grade bauxites, containing up to 70%  $Al_2O_3$  and 7%  $SiO_2$ .



## 6. COMMERCE AND TRANSPORT OF BAUXITE. ECONOMIC ASPECTS

284. Alcan. Outstanding quarter. Mining Journal, Vol. 188. No. 7399. 10.Jun. 1977. p.458.

Alcan's European operations showed a marked improvement over the corresponding period of 1976, whilst the 50% owned Japanese affiliate and the Jamaican operations again showed a loss for the quarter, but in both cases the loss was at a reduced level.

285. Alcoa Jamaica resumes bauxite shipments: Mining Journal, Vol.287. No. 7356. 13.Aug. 1976. p.120.

The explosion of a pressure vessel at its 550 000 tonne/year Clarendon refinery forced the closure of the plant. The company expects to take a year to repair the vessel but a second slightly damaged vessel should be restored by September 1 when operations will be resumed at 50% of capacity.

286. BAIKAY, B.: Raw materials for the aluminium industry up to the year 2000. B. Internationale Congresses du Min. Mondial, /Hongrie, 1974/ pp. 1-6. /French/

World reserves of bauxite, problems of transport and energy, future raw materials and processes for the production of alumina are discussed.

287. Bauxite/Alumina-Sea trade recovery. Mining Journal, Vol.288. No.7384. 25.Feb. 1977. p.134.

By 1980 trade in bauxite and alumina is expected to reach 52,6 million tonnes, a gain of 2% over the 1974 level of 42,4 million tonnes. Alumina tonnage movements are expected to rise at a still faster rate, reaching 13,7 million tonnes in 1980 as compared with 10,0 million tonnes in 1974.

288. BOKAR, A.: Know-how, engineering and expertise—currency earners by the Hungarian aluminium industry. Magyar Aluminium, Vol.12. No.3/4. 1975. pp. 84-88.

Experience in developing domestic reserves of medium- and low-grade bauxite has given the Engineering Center of the Hungarian Aluminium Corp. /Aluterv/ the expertise necessary to design a number of world-

-wide production plants. Examples are reviewed for plants in India /200 000 tons/year/, Rumania /250 000 tons/year/, Yugoslavia /300 000 and 600 000 tons/year and Greece /600 000 tons/year/. Geological surveys also indicate that sufficient bauxite ore will be available to erect a medium-size alumina plant in North Vietnam.

289. DUBOS, G.: The technology and economics of processing low-grade bauxites. In: Studies in alumina and aluminium production. United Nations Industrial Development Organization, 1973. /Paper No. ITD. 170, 15.Mar./ p. 58.

The suitability of an ore for Al production is determined primarily by economic and political factors rather than by the technology and the quality of the bauxite; for example, the high-grade African deposits have not been developed because of unsuitable political prospects, whereas those in Australia and Jamaica are regarded more favorably. Bauxite deposits with high  $\text{SiO}_2$ /6-8%/ are not generally suitable for future development. One trend is the location of plants of 1,2 to 1 million ton capacity near the bauxite deposits of Australia and Africa. The world total bauxite reserves /including gibbsite, boehmite and diasporite/ are estimated as 3993-6310 million tons. Maximum recovery of  $\text{Al}_2\text{O}_3$  is based on combination processes some of which recover Fe and manufacture cement. For locations remote from Fe ore, recovery of the Fe content of red becomes important. In the Goa, Maharashtra and Gujarat regions of India there are hundreds of millions of tons of bauxite with  $\text{SiO}_2$  below 5% , 28 ref.- P.G.N.

290. Fitzgerald Bauxite-alumina report. I.M. Light Metal Age, Vol.32. No.5/6., Jun.1974. pp. 18-21.

Although the world's third largest producer of bauxite and alumina, Australia has failed to profit adequately from its largely foreign owned operations and should maximize its ownership of its high-quality bauxite deposits. Income taxes and royalties have been minimal during Australia's 15 year rise to a first-rank supplier due to several factors discussed. Coordination of national and state policies is needed after weighing the advantages and disadvantages of any action to be taken. This action could hold considerable significance for the world Al industry.

291. Guayana approves bauxite industry reorganization. Mining Journal, Vol. 188. No.7399. 10.Jun. p. 455.

Under the new plans the two existing companies, Guayana Bauxite company /Guybau/ and Berbice Mining Enterprises /Bermine/, will be merged. The merged company will be known as the Guyana Mining Enterprise /Guymine/, which will operate /Bico/, the holding company, for both Guybau and Bermine.

292. GUINARD, C.: Bauxite in Indonesia. Revue de l'Aluminium, No. 444, Oct. 1975. pp. 436-437. /French/

Bauxite will be extracted on a large scale in the Kalimantan. Plant construction should start in 1976. Two power stations will operate with full capacity in 1983 and the aluminium plant should reach a yearly output of 75 000 tons by 1981, and attain its full output of 225 000 tons yearly by 1983. 50 000 tons will go to the home market, while 175 000 tons will be taken over by Japan.

293. HUGUENEY, M.: Aluminium in Surinam. Revue de l'Aluminium, No.436, Jan. 1975. p.14. /French/

Surinam acquired the total of assets of the N.V. Grasshopper Aluminium Co. /Grassalco/ by repurchasing 50% from Reynolds, their former owner. The company was founded with the purpose of extracting bauxite and to produce alumina in Western Surinam.

294. HUGUENEY, M.: Dealings of Reynolds' on bauxite from Guyana. Revue de l'Aluminium, No.437. Feb. 1975. pp. 75-76.

Until now Reynolds purchased about 10% of its bauxite requirements in Guyana. It is uncertain whether they will continue to buy in the future from their own former daughterfirm, as the price asked for has lost its attraction. It is also doubtful whether the nationalization of the Reynolds-assets will prove profitable for Guyana, at least hardly in the nearest future.

295. HUGUENEY, M.: Egypt, third aluminium producer of the Middle East. Revue de l'Aluminium, No.441. Jun. 1975. pp. 293-294. /French/

There exist in Egypt two aluminium deposits for ultimate utilization, instead using imported alumina: the nepheline deposits at Jebel Abu Khourouj in the Eastern Desert and the clay of the Assuan region. Extraction technology to be applied is either the acid or the alkaline process.

296. HUGUENEY, M.: Jamaica-- the bauxites negotiations /Second-round/. Revue de l'Aluminium. Vol.439. Apr. 1975. pp. 184-186.

If the second round of negotiations now in progress achieves positive results some normalization of relations between the government and the companies which will benefit both parties may be expected. In such a case, Reynolds and Alcoa, following the example of Kaiser, would probably withdraw the request for arbitration which they made to the International Center for the Settlement of Investment Disputes following the heavy increase in tax on bauxite introduced in June 1974. to take effect retrospectively from 1 Jan. 1974. A contrary

result would possibly lead to the disengagement of the companies from this country and an intensification of their efforts to obtain the alumina they need from other bauxite producing countries or from national minerals other than bauxite.

297. HUGUENEY, M.: Jamaica's New policy towards aluminium producers. *Revue de l'Aluminium*, Vol.431. Jul/Aug. 1974. pp. 382-383. /French/

Until now world producers of Al have used bauxite for alumina production almost exclusively as the treatment of other ores is 25 to 33% more costly. The new tax on bauxite introduced by Jamaica will considerably reduce the difference between the production price of alumina from bauxite and that from other ores /shales, clays, etc./ which can be found in the Al producing countries. Substitute minerals could therefore have an "important part to play in the coming expansion phase of the industry". It may be said, in conclusion, that their role will be all the greater as the taxation of bauxite by producing countries becomes higher.--EPAA/P.

298. HUGUENEY, M.: Towards utilization of bauxite deposits of the Salomon islands. *Revue de l'Aluminium*, No.448. Feb. 1976. pp. 60-61. /French/

The Conzino Rio Tinto of Australia, a subsidiary company of the RTZ group, has shown an interest already in 1968 in the bauxite reserves of the Salomon islands; they are prospecting now jointly with the Japanese group Itoh and Company the bauxite reserves at the Wana Wana and Wagina islands.

299. Implications for the aluminium industry of the changes in supply conditions of Bauxite. *Revue de l'Aluminium*, No. 455. Oct. 1976. pp. 433-438. /French-English-German-Spanish/

The results of the ad hoc working party charged by the O.E.C.D. to study aspects of "industrial adaptation and the Al industry" have recently been published. Four reports were prepared on topics of crucial interest. Excerpts from two of them, with comments, have already been published in *Rev.Alum.*: "Inflation and the Primary Al Industry", and "Energy and the Primary Al Industry." The third report, relating to bauxite, is discussed in this issue.

300. KOSTIC, E.: Some Techno-economic factors affecting the evaluation and usage of low-grade nonferrous metal ores. Pt.2. *Technika* /Belgrade, Vol.30. No.3. 1975. /Serbo-Croatian/.

The most significant factors affecting the valuation of bauxite and Ni mineral deposits as raw materials for Al and Ni production are considered. Chemical composition of bauxite, type of processing, the effect of SiO<sub>2</sub> content and of commercial conditions and Ni content

and type of Ni ores are discussed, with special reference to the Yugoslav deposits.-GA.

301. LEVI, D.L.: Learning from Russia in alumina output. Levi Times, No. 59239. 8. Nov. 1974. p. 20.

The Russian Al industry is based to a large extent on silicate materials, especially nepheline instead of on bauxite. Use of silicates offers a byproduct cheaply convertible to cement. Apart from lowering  $Al_2O_3$  cost, U.K. use of colliery shales would reduce cement production cost 20% and the fuel requirement therefore 50%. Full use would save one million tons/year or, with other changes of practice, possibly four million tons/year coal or coal equivalent. Most bauxites contain a high proportion of Fe which is lost in processing. The effective destruction of an important source of Fe ore is now undesirable. This will open the way to a more productive use of bauxite itself. The change in smelter- $Al_2O_3$  raw material involves "no special technical difficulty".

302. LI, K.W.; FRIDAY, J.R.: Simulation of coke calcinators. Carbon, Jun. 1974. pp. 225-231. /French/

The manufacturing process with its flowchart is described and the costs of its utilization are analyzed. The authors believe that owing to the growing price of bauxite and the difficulties in its procurement, the process might be considered as economic in a not too far future.

303. McCULLOCH, H.W.: Cost assessments for the Production of Andalusite Concentrates. Johannesburg, 1976. National Institute for Metallurgy, 28 pp. /NIM Rep. No.1445./

The production costs of andalusite concentrates in the Groot Marico district are presented for varying mining rates and selling prices in the form of nomograms. These diagrams show that the concentrates can be produced economically and that the profitability is higher for export sales than for local sales. The economically optimum grade of concentrate from the Groot Marico deposits is that having an  $Al_2O_3$  content of between 53 and 54%, but this depends on the Fe content of the concentrate.

304. MITCHELL, : Bauxite and alumina. Mining Engineering, Vol.28. No.3. 1976. pp. 27-29.

A survey of bauxite and alumina producing countries shows that the diminished worldwide demand for Al has resulted in declined production and suspension of planned bauxite-alumina projects in some countries, while in others they are still expanding and the U.S. is seeking non-

bauxitic domestic sources of Al due to rising costs. The current state of production, exploration and development in ten countries is described. Agreements covering production, taxes and royalties between bauxite and alumina producers and governments are reported.

305. NIONCEL, J.: The bauxite supply of Reynolds Metals. Revue de l'Aluminium, No. 443. Sept. 1975. pp. 391-393. /French/

The repartition of the total bauxite supply of the Reynolds Metals Company shows the following figures for 1974:

Jamaica /49% from Jamaica Mining/	68%
Haiti /100% from their actual subsidiary/	12%
Arkansas /100% from Reynold Mining/	10%
"Purchased" from other sources	10%

306. RAYNER, M.R.: Marketing Australian bauxite. In: Southern and Central Queensland Conference. Australasian Institution of Mining and Metallurgy, Australian Victoria, 1974. pp. 41-47.

Until the early 1960s the world Al industry was dominated by six principal producers with integrated activities from bauxite mining to Al production. The growth in consumption of Al since that time and the emergence of additional producers has broadened the market for bauxite. In addition the increase in the optimum size of alumina refineries has influenced competing metal producers to unite in large joint ventures to minimize alumina costs. From these bases the paper examines present and likely future markets for Australian bauxite, differing marketing philosophies for serving those markets; factors influencing successful marketing, and the sources and relative strength of competition which Australia faces.

307. Seaborn alumina. Mining Journal, Vol.286. No.7339. 16.Apr. p.30.

Shipments of bauxite to UK are expected to increase comparatively slowly, reaching 46,5 million tonnes in 1985, an increase of 45% over the comparable shipping rate.

308. Setback for aluminium. Mining Journal, Vol.284. No. 7280. 28.Feb. 1975. pp. 149-150.

The industry is particularly reluctant to cut prices because of ever-mounting costs. Last year the governments of the various Caribbean countries producing bauxite increased their production levels on this mineral by as much as 600 per cent. Power costs are soaring and this is extremely onerous for an industry requiring from 6,5 to 8 kW/lb Al of energy to smelt the metal.

309. SEVIN, R.: Development of the world bauxite industry from 1964 to 1974. Pt.2. Journal Four Electrique, No.7. Aug/Sept. 1976. pp. 164-166.

The geographic location of the major bauxite deposits in relation to the main Al-producing countries has considerably extended intercontinental maritime trade. A report from Maritime Transport Research, London, estimates that the average distance of shipments by sea will rise from 5400 to 6300 km by 1980 and that the greatest percentage growth in tonnage will be that from West Africa. Forecast bauxite production for 1980 is 85 million tons. M. Bes de Berc, President of Aluminium Fechiney, predicts the following changes in the short term: a slowing down of economic growth leading to an annual growth rate for Al consumption of 6,5 to 7% by 1980, with corresponding repercussions on  $Al_2O_3$  and bauxite: establishment of new relationships between Al-consuming countries and the bauxite-producing countries /the high price rises imposed by the latter have been an incentive for the industrialized countries to look for new processes for the fabrication of alumina from nonbauxitic materials/, and a rise in the metal price to cover the increased costs of production so that the Al industry can maintain its development while recovering an acceptable and necessary profitability threshold.

310. SZEPESHEGYI, I.: Up-to-date mining and transport system in the mines of the Bakony. In: Proc. II. International Symposium of ICSOBA; Budapest. Oct.6-10. 1969. Budapest, 1971. Vol.2. Res.Ins.Non-Ferrous Metals, pp. 239-251.

The Bakony Bauxite Mines Enterprise has to double its bauxite production. The bulk of the bauxite reserves lies below the karstic water level. Productivity has to be raised by both the concentration and mechanization of the production. As a first step, loading was mechanized to 80 percent in the underground mines of the company. The next step was the introduction of steel props. The development of longwall faces and the mechanization of haulage allowed of the starting of experiments as regards the power loading of the bauxite.

311. To the Year 2000. Metal Bulletin, Vol.49. Jan. 1975. pp. 28-29.

The International Mining Congress. Nov. 1974, Lima is reviewed. It included a paper discussing the Al industry's raw material supply position. In 1972, total world primary Al production was 11,5 m metric tons, from 24 m tons  $Al_2O_3$  and 68 m tons bauxite. Global bauxite reserves amenable to Bayer treatment are 15 000 m tons /mostly in inter-tropical zones/. Even at a projected compound increase in consumption of 10%/year, this is sufficient until 2004, when consumption would be 1420 m tons/year, that is, 1500 m tons of new reserves would be required to extend the reserve life by one year. Recovery

of  $Al_2O_3$  plants could be increased 7-10% to retard depletion. Unexploited tracts and submarginals around known reserves conservatively could double reserves. To the end of the century, increased shipping costs will probably lead to "alumina smelters" being concentrated in the bauxite-producing countries. There is also the problem of red mud, for which no commercial use has been found.

312. Uranium developments in South Africa. Guyana. Selling bauxite via CCUs.- Mining Journal, Vol.287. No. 7356. 13. Aug. 1976. p. 111.

The composite currency unit /CCU/ is based on four internationally accepted currencies, three of which are actually used in the settlement of sales of the much-sought-after calcined refractor grade bauxite.

313. WINKITAUS, G.; BIELFELD, K.: Materials for the Aluminium Industry. Aluminium, Vol.51. No.10. 1975. pp. 631-633.

From a global point of view there is no raw material problem for the Al industry, and for the rest of this century there will be no bauxite shortage. As a result of the drastic increases in bauxite taxes levied by the producing countries, however, the introduction of processes for utilizing the widely available nonbauxitic Al resources has been brought forward throughout the world; some processes having been known for a long time. The results of a study have shown that the Federal Republic of Germany, too, has large resources of suitable types of clay. It is shown that the extraction of  $Al_2O_3$  from clay is already becoming competitive with conventional methods of production. The energy requirements for acid clay processing are dealt with and it is illustrated that modern process technology provides the potential for largely eliminating one of the disadvantages of clay processing, namely, the high energy consumption.

314. ZÁMBÓ, J.; OSVALD, Z.: Aspects of industrial evaluation of bauxites in Bayer processing. Costs of processing different grades of bauxites. In: Mineralogical and technological evaluation of bauxites. Proceedings of the second conference of VAMI and KFKI, Jan. 18-21, 1972, Leningrad, Budapest, 1975. VAMI-KFKI, pp. 295-305.

Fixing of realistic prices for different bauxite grades is possible only if a selling price of alumina were established that would truly reflect the value of alumina on national economy level. This would involve an evaluation on national scale. However, in price calculation, the starting point in any case should be the value of bauxite for alumina manufacture which, in the present system, is not reflected satisfactorily.



## 7. THE INTERNATIONAL BAUXITE ASSOCIATION

315. Bauxite. IBA reaches accord on pricing. Mining Journal, Vol.287. No.7362. 24.Sep. 1976. p.228.

The present membership of the IBA, which includes Australia, the Dominican Republic, Ghana, Guinea, Guayana, Haiti, Indonesia, Jamaica, Sierra Leone, Surinam and Yugoslavia, is said to account for some 70% of known world bauxite reserves and, on the basis of last year's bauxite production estimates, to provide nearly 80% of Western World output and some 65% of global bauxite production.

316. GUINARD, C.: Choosing to-day the material of tomorrow. Revue de l'Aluminium. No.442. Jul/Aug. 1975. pp.335-336.

The standpoint taken by bauxite producer countries and IBA members should result in an increase in the cost of the raw materials which go to make up aluminium sheet, but development of new alumina production processes such as the  $H^+$  should bear on the behaviour of bauxite producer countries and in the longer term appreciably reduce the impact of these price increases.

317. HUGUENEY, M.: The International Bauxite Association. Revue de l'Aluminium, No.461. Apr. 1977. pp. 155-156.

The IBA is constituted of three managing bodies: a council of ministers of the member countries, an executive committee, and a secretariat. Any bauxite producer country is entitled to request being a member of the association.

### 8. REPLACEMENT POSSIBILITIES OF BAUXITE

318. Alumina products look to alternate raw materials. Chemical Engineering, Vol.81. No.9. 29.Apr. pp. 98-99.

Attempts are being made to develop alumina processes based on ores other than bauxite so as not to depend entirely on the non-Western World for raw materials. Many pilot plants were started in France, U.S., etc. Such ores as alunite  $H_2SO_4$  laterite kaolin are used. Pechiney in France uses a concentrated  $H_2SO_4$  leach that produces  $Al_2/SO_4/3$  from ore. During the crystallization some HCl is added which produces  $AlCl_3$  that crystallizes well and yields a low impurity alumina powder. A schematic view is presented of manufacturing alumina from alunite ore by Earth Sciences which combines its process with the modified Bayer route in which a NaOH solution leaches the alumina from the quartz.

319. Bauxite waste tests O.K. as flocculant. Canadian Chemical Processing, Vol.60. No.3. 1976. p.26.

As tertiary treatment becomes more common, there'll be a growing market for lowcost Al or Fe ion. Alcan is checking into a waste material of its bauxite refinery. It is a low-cost flocculant for wastewater in the stockpile of aluminized red mud solids that has been building up.

320. BAUDART, G.A.: Alumina without bauxite. Revue de l'Aluminium. No.437. Feb. 1975. pp. 57-61.

The problem of producing Al from ores other than bauxite has once more come to the fore, particularly since the imposition of a heavy tax on production by some bauxite-supplying countries. However, even if the breakthrough in this field is not a new one and its solution in no way represents—as some would like to think— an obscure move against the developing countries where bauxite is an important resource.

321. BLISS, N.W.: Non-bauxite sources of alumina: a survey of Canadian potential. Canadian Mining and Metallurgical Bulletin, Vol.69. No.774. Oct. 1976. pp. 75-85.

Of the three igneous rocks that have been used as a source of alumina, only anorthosite is considered as a potential source in Canada. The Al

content would be extracted by a sinter process, which currently requires a raw material with a minimum of 28%  $\text{Al}_2\text{O}_3$ . Thus, about 4 tons of anorthosite and 10 to 12 tons of limestone are needed to produce one ton of alumina. High-alumina anorthosites are somewhat rare; the low-alumina anorthosites are much more common, particularly in Eastern Canada. The reserves are immense, although their low  $\text{Al}_2\text{O}_3$  content could be constraints to their development. Fly ash and nepheline syenite can also be used in a sinter process, but neither is likely to be utilized in Canada in the immediate future. The  $\text{H}^+$  process utilizes an acid attack to leach Al from a raw material with at least 20%  $\text{Al}_2\text{O}_3$ . One of the best raw materials is kaolinite-bearing clay, but Canada is apparently deficient in clays with sufficient reserves.

322. HOSKIN, J.R.; TUBEY, L.W.: Experimental production of calcined bauxite for its utilization as road-building aggregate. *Revue de l'Aluminium*, No.436. 1975. GRA 1973. 19 p.

Best results can be achieved by high  $\text{Al}_2\text{O}_3$  contents /more than 65%/.  
Small iron contents /20% or less Fe/ is favorable, whileas the  $\text{SiO}_2$  content should remain rather low /less than 10%/.

323. KAPOLYI L.: Principles of complex utilization of mineral resources. *Zesz.Nauk.Akad.Gorn.Hutn., Cracow, Ceram.*, No.28. 1975. pp. 7-96. /Polish/

Utilization of coal ash for  $\text{Al}_2\text{O}_3$  and cement production is discussed. A mathematical model describing the technological process is presented. The  $\text{CaO-SiO}_2\text{-Al}_2\text{O}_3$  system, role of impurities, crystallography, leaching, thermal decomposition and sintering are discussed.

324. MERCIER, H.: The aluminium industry: Replacement of bauxite by more abundant minerals. *Informations-Chimie*, No.145. Jun.1975. Special Issue, pp. 191-192. /French/

The author considers the reasons militating for the search for minerals other than bauxite for the production of Al: predictable exhaustion of deposits within a few decades, distance between extraction and treatment sites. The treatments applicable to various aluminous minerals to extract the alumina are surveyed. The article concludes with a comparison of the energy consumption in therms/ton of  $\text{Al}_2\text{O}_3$  obtained: Bayer 3000/3500, Pechiney  $\text{H}^+$  5500/6500, nepheline sintering in the USSR, 9000/12 000.

325. RADCLIFFE, D.: Kyanite. *Mining Engineering*, Vol.28. No.3. 1976. pp. 39-40.

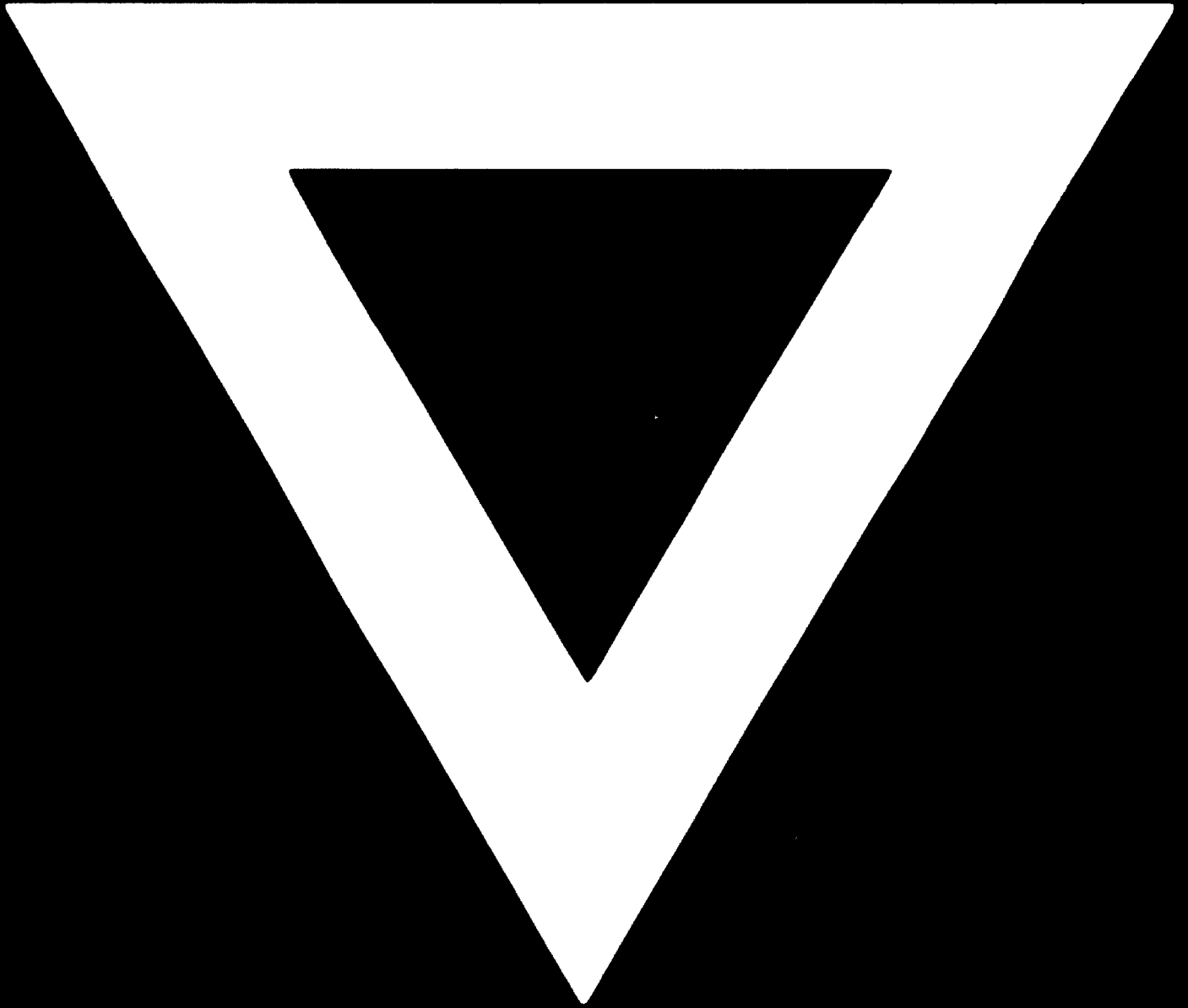
The 1975 U.S. production of kyanite was restricted to two companies and fell below that of 1974. Increased production is expected in the

use of kyanite concentrates in the manufacture of aluminium oxides and Al alloys. Expansion of a Georgia plant scheduled for 1976 will produce a 56%  $Al_2O_3$  grade. Deposits are being explored at North Bay, Ontario. An electrolytic plant site will be necessary to process the concentrates available in Idaho. The most significant foreign development is the construction of a complex in Brazil.

326. SUZUKI, T.: Kaoline appears before the footlights as a second source of aluminium. Kinshoku, Vol.45. No.2. 1975. pp. 25-26. /Japanese/.

Processes to produce Al from ore other than bauxite are reviewed.

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**81.07.02**