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Phosphorus, Sulfur, and Silicon and the Related Elements

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A Review of: "Sulfur: New Sources and Uses. Proceedings of the 1981 Symposium. M. E. D. Rayment, Ed. ACS Symposium Series 183, ACS. Washington, D.C. 1982, 262 pp. \$33.95, and Sulphur-81: Proceedings of an International Conference on Sulphur. Edited by the Staff of the Sulphur Development Institute of Canada, Calgary, Alberta, 1981, 732 pp. (folio) \$125.00."

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Book Reviews

Sulfur: New Sources and Uses. Proceedings of the 1981 Symposium. M. E. D. Raymont, Ed. ACS Symposium Series 183, ACS, Washington, D.C. 1982, 262 pp. \$33.95, and *Sulphur-81: Proceedings of an International Conference on Sulphur.* Edited by the Staff of the Sulphur Development Institute of Canada, Calgary, Alberta, 1981, 732 pp. (folio) \$125.00.

These two volumes, both photoreproductions of typewritten manuscripts, contain papers presented at the ACS National meeting in Atlanta, April 1981, and at the international conference held in Calgary in May, 1981. The ACS volume contains fourteen chapters. M. Rieber (University of Arizona) reports on New Sulfur Sources in the United States; D. K. Fleming (Institute of Gas Technology) summarizes Sulfur Recovery from New Energy Sources; J. B. Hyne (University of Calgary) describes Recent Developments in Sulfur Production from Hydrogen Sulfide-Containing Gases; D. K. Beavon, B. Kouzel and J. W. Ward (Ralph M. Parson and Union Oil Companies) outline Claus Processing of Novel Acid Gas Streams; A. W. Hyndman, J. K. Liu and D. W. Denney (Syncrude Canada Ltd) report on Sulfur Recovery from Oil Sands; D. Gray, M. Neuworth, A. El Sawy, G. Tomlinson and S. I. Freedman (MITRE Corporation and U.S. Department of Energy) assess the Potential Impact of Synthetic Fuels on the Sulfur Industry; A. T. Wilson (Duval Corporation) describes Sulfur from Hydrometallurgical Processing of Sulfide Materials; M. C. Manderson and C. D. Cooper (Manderson Associates and University of Central Florida) report on Sulfur Supply and Demand and its Relationship to New Energy Sources; D. R. Muir (SUDIC, Calgary) covers New Product Opportunities for Sulfur; N. G. Shrive, J. E. Gillott, I. J. Jordaan and R. E. Loov (University of Calgary) describe the Potential and Properties of Sulfur Concretes; D. Saylak and W. E. Conger (Texas A & M University and Chemical Enterprises) present a Review of the State of the Art of Sulfur Asphalt Paving Technology; R. H. Funke and W. C. McBee (Bureau of Mines and ASARCO) describe Industrial Application of Sulfur Concrete; G. D. Love and E. T. Harrigan (U.S. Federal Highway Administration) describe their Program on Road Construction Using Sulfur, and R. L. Terrel (University of Washington) reports on the Potential for New Sulfur Products in the Middle East.

The Calgary proceedings contains sixty-three papers from thirteen sessions dealing with many aspects of sulfur research, applications and economics. Since the volume is not widely accessible, the titles are listed here: Free World Sulphur Supply and Demand Outlook into the early 1990's by M. C. Manderson (Manderson Associates); The Challenge of Marketing World sulphur, by R. Q. Phillips (CANSULEX), New Uses for Sulphur—An Overview, by J. M. Lancaster (British Sulphur Corporation), Understanding Sulphur—the Key to Advancement of its Technology, by J. B. Hyne (University of Calgary); Sulphur Transportation Logistics and Economics for New

Uses, by L. W. Friberg and K. B. Doyle (SULTRAN); The Bottom Line for Sulphur ASPHALTS, by R. L. Yarbrough (National Asphalt Pavement Association) Sulphur Concrete Applications in North America by R. L. Smith (Consultant); The Middle East—A Potential Market for Sulphur Asphalt and Concretes, by W. Akili and A. E. Dabbagh (University of Dharahn), Elemental Sulphur—the European Situation by M. Nicolas (Soc. Nat. Elf Aquitaine); Supply and Demand for Sulphur in the United States by J. E. Shelton (U.S. Bureau of Mines); Supply and marketing of Mexican Sulphur, by E. Ordiales (Azufrera Panamericana); Canadian Sulphur Offshore Export Capability (E. R. Boonstra and E. L. Cox (Shell Canada); A Strategic Analysis of the Canadian Sulphur Situation to 1990, by B. Prentice (Agrichemicals); Supply and Marketing of Middle East Sulphur, by J. F. Babbitt (DEVCO Inc.); Initial Results from Field Testing of SEA Paving Mixtures in the State of Washington by J. P. Mahoney and R. L. Terrel (University of Washington); Alberta Experience with Sulphur Extended Asphalt Pavements, by B. P. Shields, J. T. Christison and D. P. Palsat (Alberta Research Council); Sulphur Extended Asphalt Pavements: Two Test Roads in Eastern Saudi Arabia by W. Akili (University of Dharahn); Pavement Maintenance with Sand-Asphalt-Sulphur Mixtures, by R. W. Culley (Shell Canada); Freeze/Thaw Durability of Sulphur Concretes, by N. G. Shrive, J. E. Gillot, I. J. Jordaan and R. E. Loov (University of Calgary); Fatigue Behavior of Plasticized Sulphur Concrete, by D. Y. Lee and F. W. Klaiber (Iowa State University); Fibre-Reinforced Sulphur Concrete by J. L. K. Ho and R. T. Woodhams (University of Toronto); New Approaches and Techniques to Sulphur Plasticization and Fire Retardation, by A. A. Anani, A. F. Halasa, A. Al-Mobasher and N. Al-Awadi (Kuwait University); The World Phosphate Industry and its Relationship to the World Sulphur Industry, by A. Benchekroun and M. K. Lamrani (Phosphates Casablanca); The Cost Outlook for Sulphur by B. Bain (FERTECON); A perspective of Sulphur Production by A. K. Thusoo, T. A. Hamilton, and P. M. Quinlan (Partec-Lavalin, Inc); Pyrites—an Important Source of Sulphur by H. Fangel (Holger-Fangel Inc); Sulphur Production by Pressure Leaching of Metal Sulphides by G. L. Bolton (Sherritt Gordon Mines); U.S. Outlook for Sulphur Recovery from Hydrocarbons and Synfuels, by D. G. Rangnow (Pace Company); Fatigue and Permanent Deformation properties of Conventional and sulphur asphalt concrete, by A. T. Bergan and L. G. Watson (University of Saskatchewan); Rheological Characteristics of sulphur Extended Asphalts used for Road Pavements, by A. F. Bissada (Kuwait University); Recycling of Sulphur Asphalts by H. J. Fromm (Ontario Ministry of Transportation); The Role of Sulphur in Sulphur Extended Asphalt Pavements by W. C. McBee, P. A. Romans, T. A. Sullivan and R. R. Uhde (Bureau of Mines); Modified Sulphur Concrete Technology W. C. McBee, T. A. Sullivan and B. W. Jong (Bureau of Mines); The Placing of Sulphur Concretes with Conventional Equipment, by R. L. Yarbrough (University Asphalt Co); Sulphur Concrete in the metallurgical/Fertilizer Industry by R. T. Saxon (COMINCO Ltd); Sulphur Concrete Production In plant and In Situ, by W. D. Jones (F. B. Coating Systems Ltd); Sulphur Concrete in Highway Applications, by G. D. Love (Federal Highway Administration); Sulphur Forming & Handling Facilities, R. A. Joyce (Sultran Ltd); Ram River Sulphur, by J. E. Martin and E. Oloriz (Aquitaine Canada Ltd); Forming: Procor—GX Granulating Process, by L. G. Peppler (Procor Ltd.); Wet Formed Sulphur—Today's Perspective, by A. W. Deszynski (Burza Resources

Ltd); Sulphur fob Vancouver—Two Decades and Twenty Million Tons—A Deep-sea Terminal's Experience, by J. MacKay (Vancouver Wharves Ltd); Specifications for Sulphur Asphalt Pavements, by Richard C. Ingberg (Minnesota Dept of Transportation); Quality of Sulphur Extended Asphalt from North Dakota State Highway Department Experience, by Robert T. Peterson (North Dakota State Highway Dept); Sulphur Asphalt from a Contractor's Point of View, by Leo A. McArthur (Miller Paving Ltd); Sulphur Extended Asphalt (SEA) in Recycled Bituminous Paving—Wisconsin Project 1181-05-72 Construction Report, by Emil H. Meitzner and C. J. Mathy, Jr. (Wisconsin Dept. of Transportation and Mathy Construction); Economics of Sulphur Asphalt Pavements, by G. J. A. Kennepohl and B. C. St. George (Gulf Canada Ltd); Pre-Molded Sulphur Concrete Blocks, by R. L. Terrel and K. Babaei (Univ. of Washington); Sulphur-Marl Construction Blocks, A. K. Azad and S. Q. Ali (Univ. Petrol. & Minerals, Dhahran, Saudi Arabia); Sulphur-Concrete Sandwich Construction Units, M. H. Baluch and T. G. Brown (Univ. Petrol. & Minerals, Dhahran, Saudi Arabia); Stabilization of Soils and Rocks Using Molten Sulphur, by J. A. Franklin and O. Hungr (Morton & Partners Ltd and Univ. of Alberta); Structural, Fibre-Reinforced, Sulphur-Based Composites, by B. S. Bryant and B. G. Lee (Univ. of Washington); Sulfurwood—A Fibre-Reinforced Syntactic Sulphur Foam, by D. W. Egan, E. Nishimura and R. T. Woodhams (Univ. of Toronto); Silicone Fluids as Sulphur Processing Aids, by D. L. Coon and J. H. D. Harvey (Dow Corning); Process and Equipment for Quasi-Adiabatic Phase Changes and Combustion of Prilled Sulphur, by Z. Leszczynski and A. Ligeza (Inst. Chemii Przemyslowej, Warsaw); The Ageing of Solidified Sulphur and Effects on Formed Products, by B. W. Kobryn and J. B. Hyne (Univ. of Calgary); Controlling Sulphur Dust, by P. Kuhn (Emaco Ltd); Sulphur Dust Formation During Simulated Loading Operations, by A. Meisen, K. H. Manji and M. P. Ellis (Univ. of British Columbia); Environmental and Safety Aspects of the Use of Sulphur In Highway Pavements—Part I—Mix Preparation and Construction, by D. Saylak, L. E. Deuel, Jr., and R. Zahray (Texas Transp. Institute); Environmental and Safety Aspects of the Use of Sulphur in Highway Pavements—Part II—Weathering and In-Service Considerations, L. E. Deuel and D. Saylak (Texas Transp. Institute); Safety Aspects of Handling Sulphur, by G. S. Vassie (Shell Canada Resources Ltd); Sulphur Melting Technology, by S. Y. Tse (Calgary consultant); Stabilizing Sulphur with Phosphorus, by B. R. Currell and F. W. Parrett (Thames Polytechnic, London and Royal Military College of Canada).

Both books are full of interesting information which is not available otherwise. However, both volumes are very loosely organized, making it very difficult to find information. The ACS symposium has a short index; the Calgary conference none. One wonders whether all authors are fully aware of the work of other conference participants. This leads to duplication. Another problem concerns references. Many articles list mainly work of the author or his group. Both books abound in indirect references, such as articles in news media, and both are short on references in the refereed technical literature. In short, both books lack editing, a problem common with symposium proceedings.

Both volumes give an overview of the research and development interests of the Canadian Sulphur Development Institute, a trade organization which sponsors and conducts mission-oriented research, stimulates and acquires inventions and licences

patents. Unfortunately, the books contain no references to the several comprehensive in-house studies of this organization, and the volumes omit some excellent research and development work outside of this trade group. Despite these shortcomings, these two volumes contain much valuable information for patient readers who seek a starting point for learning about the almost unlimited potential for the applications that pervade every form of sulfur chemistry.

BEAT MEYER

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