

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY

EDWIN J. VANDENBERG

Transcript of an Interview
Conducted by

Herman Skolnik

in

New Orleans, Louisiana

on

1 September 1987

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY

Oral History Program

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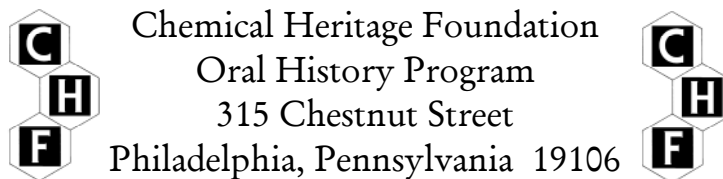
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EDWIN J. VANDENBERG

1918 Born in Hawthorne, New Jersey on 13 September

Education

1939 M.E., Stevens Institute of Technology

Professional Experience

1939-1944 Research Chemist, Hercules Incorporated
1944-1945 Assistant Shift Supervisor, Sunflower Ordinance Works

1946-1957 Research Center, Hercules Incorporated
Research Chemist
1957-1965 Senior Research Chemist
1965-1982 Research Associate

1983- Arizona State University
Adjunct Professor of Chemistry
Visiting Professor of Chemistry

Honors

1964 Best Paper Award, Delaware Section, American Chemical Society
1965 Industrial Research 100 Award
1965 D.Eng., Stevens Institute of Technology
American Chemical Society
1979 Delaware Section Award
1981 Award in Polymer Chemistry
1983 Polymer Chemistry Division Service Award
1991 Award in Applied Polymer Science

ABSTRACT

Vandenberg grew up in Hawthorne, New Jersey, where his father owned a grain and feed store. After talking about his schooling, where he learned the violin, Edwin Vandenberg recalls a friend and his home laboratory. Attending Stevens Institute of Technology, Vandenberg concentrates on chemical subjects, influenced by F. J. Pond. His first years at Hercules were with Spurlin's paper chemistry group, where he contributed to the understanding of paper sizing as a colloid phenomenon. After a spell working on the wartime production of smokeless powder, Vandenberg returns to the Hercules research center to work on a wide range of polymer syntheses, which he describes in some detail. The interview concludes with an account of his retirement activities at Arizona State University, and reflections on his family, colleagues and ACS activities.

INTERVIEWER

Herman Skolnik received the B.S. degree in chemical engineering from Pennsylvania State University, and the Ph.D. degree in organic chemistry from the University of Pennsylvania. He joined Hercules, Inc., as a research chemist in 1942, and served as a divisional research manager from 1952 until his retirement in 1979. He was the founding editor of The Journal of Chemical Documentation, and has published over 200 papers and four books, including A Century of Chemistry, the centennial history of the American Chemical Society.

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NOTES

1. L. Gatterman, Laboratory Methods of Organic Chemistry, revised by H. Wieland, (New York: Macmillan, 1932).
2. Harold A. Abramson, "Modification of the Northrup-Kunitz Microcataphoresis Cell," Journal of General Physiology, 12 (1929): 469-472.
3. Harold M. Spurlin and Edwin J. Vandenberg, "Rosin-Sized Paper," Canadian Patent 430,676, issued 16 October 1945 (application filed 26 May 1943).
4. Edwin J. Vandenberg, "Emulsion Polymerization of Unsaturated Organic Compounds," U.S. Patents 2,648,657 and 2,648,658, issued 11 August 1953 (application filed 12 April 1947).
5. Edwin J. Vandenberg, "Process for Low-Temperature Polymerization Using a Dehydrogenated Rosin-Acid Soap," U.S. Patent 2,682,528, issued 29 June 1954 (application filed 18 March 1953).
6. George E. Hulse and Edwin J. Vandenberg, "Cumene Hydroperoxide in Oxidation-Reduction Emulsion Polymerization," Industrial and Engineering Chemistry, 40 (1948): 932-937.
7. I. M. Kolthoff, A. I. Medalia and M. Youse, "Redox Recipes. III. Use of Various Sugars at 0° and 30° in a Cumene Hydroperoxide-Iron-Sugar Recipe," Journal of Polymer Science, 6 (1951): 93-109.
8. Eugene J. Lorand, "Emulsion Polymerization of Unsaturated Organic Compounds," U.S. Patent 2,569,480, issued 2 October 1951 (application filed 22 March 1946); see also, E. J. Lorand and E. I. Edwards, "p-Methylbenzyl Hydroperoxide," Journal of the American Chemical Society, 77 (1955): 4035-4037.
9. see H. Boardman, "Mechanism of Reduction of Cumene Hydroperoxide. I. Reduction by Electron Transfer with Ferrocyanide Ion," Journal of the American Chemical Society, 75 (1953): 4268-4271.
10. Heinrich Hock and Shon Lang, "Autoxydation von Kohlenwasserstoffen. IX. Über Peroxyde von Benzol-Derivaten" (Autoxidation of Hydrocarbons. IX. Peroxides of Benzene Derivatives), Berichte der Deutschen Chemischen Gesellschaft, 77B (1944): 257-264.

11. Harold Boardman, "Preparation of Aryldialkyl Peroxides," U.S. Patent 2,668,180, issued 2 February 1954 (application filed 1 July 1950).
12. E. I. du Pont de Nemours & Company, Inc., "Polymerization and Copolymerization of Ethylene," British Patent 787,375, issued 4 December 1957 (applications filed 25 January 1955 and 1 February 1955).
13. Edwin J. Vandenberg, "Polymerization of Ethylene," U.S. Patents 2,914,519 and 2,914,520, issued 24 November 1959 (application filed 19 March 1957).
14. Hercules Powder Company, "Polymerizing Olefins," British Patent 807,204, issued 7 January 1959 (application filed 29 July 1955).
15. Edwin J. Vandenberg, "Catalysts for Stereospecific Polymerization of 1-Olefins," U.S. Patent 3,261,821, issued 19 July 1966 (application filed 31 December 1959).
16. Edwin J. Vandenberg, "Titanium Trichloride Catalyst Component for Propylene Polymerization," U.S. Patent 4,211,670, issued 8 July 1980 (application filed 25 January 1979).
17. D. S. Breslow and N. R. Newburg, "Bis(cyclopentadienyl) Titanium Chloride-Alkyl Aluminum Complexes as Catalysts for the Polymerization of Ethylene," Journal of the American Chemical Society, 79 (1957): 5072-5073.
18. see C. E. Schildknecht, S. T. Gross, H. R. Davidson, J. M. Lambert and A. O. Zoss, "Polyvinyl isoButyl Ethers. Properties and Structure," Industrial and Engineering Chemistry, 40 (1948): 2104-2115; C. E. Schildknecht, S. T. Gross, and A. O. Zoss, "Isomerism in Vinyl and Related Polymers," ibid., 41 (1949): 1998-2004.
19. E. J. Vandenberg, W. R. Diveley, L. J. Filar, S. R. Patel and H. G. Barth, "Rigid-Chain Water-Soluble Polymers. I. Poly[N,N'(sulfo-p-phenylene)terephthalamide] and Poly[N,N'(sulfo-p-phenylene)pyromellitimide]," Polymeric Materials; Science and Engineering 57 (1987): 139-143; J. C. Salamone, S. F. Krauser, R. E. Richard, S. B. Clough, A. C. Watterson, E. J. Vandenberg, W. R. Diveley and L. J. Filar, "II. Derivatives of Poly[N,N'(sulfo-p-phenylene)terephthalamide]," ibid., 57 (1987): 144-148.

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