

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY

ROBERT ARMSTRONG

Transcript of an Interview
Conducted by

James J. Bohning

at

Highland Beach, Florida

on

1 May 1986

Robert T.

Armstrong

JH
3/15/96

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY

Oral History Program

RELEASE FORM

This document contains my understanding and agreement with the Center for History of Chemistry with respect to my participation in a tape-recorded interview conducted by

Dr. James J. Bohning on 1 May 1986.

I have read the transcript supplied by the Center and returned it with my corrections and emendations.

1. The tapes and corrected transcript (collectively called the "Work") will be maintained by the Center and made available in accordance with general policies for research and other scholarly purposes.
2. I hereby grant, assign, and transfer to the Center all right, title, and interest in the Work, including the literary rights and the copyright, except that I shall retain the right to copy, use and publish the Work in part or in full until my death.
3. The manuscript may be read and the tape(s) heard by scholars approved by the Center subject to the restrictions listed below. The scholar pledges not to quote from, cite, or reproduce by any means this material except with the written permission of the Center.
4. I wish to place the following conditions that I have checked below upon the use of this interview. I understand that the Center will enforce my wishes until the time of my death, when any restrictions will be removed.
 - a. No restrictions for access.
 - b. My permission required to quote, cite, or reproduce.
 - c. My permission required for access to the entire document and all tapes.

This constitutes our entire and complete understanding.

(Signature)

Robert T. Armstrong

(Date)

March 15, 1989

ROBERT ARMSTRONG

1909 Born in Chadron, Nebraska on 27 December

Education

Massachusetts Institute of Technology
1931 S.B., chemistry,
1935 Ph.D., organic chemistry,

Professional Experience

Massachusetts Institute of Technology
1928-1935 Assistant Chemist
1935-1937 Instructor, organic chemistry
U.S. Rubber Company, Passiac, N.J.
1937-1941 Chemist
1941-1944 Group Leader
North American Rayon Corporation, Elizabethton,
Tennessee
1944-1946 Research Chemist
Celanese Corporation of America
1946-1949 Group Leader
1949-1950 Technical Superintendent
1951-1952 Director, Technical Control
1952-1953 Associate Director of Research
1953-1956 Technical Director, Textile Division
1956-1966 Vice-President, Technical Director
1966-1975 Senior Vice-President, Research

ABSTRACT

Dr. Robert Armstrong describes his childhood in Nebraska and Arizona and how he managed to support himself through undergraduate and graduate studies at the Massachusetts Institute of Technology. He recollects the faculty at MIT and the support that some of his teachers gave him during his stay there. After graduate research, Armstrong moved to the U.S. Rubber Company, where he coupled investigations of rubber vulcanization with pioneering research on radical polymerization; he early recognized the value of systematic studies of copolymerization. During World War II he was persuaded to work at the North American Rayon Company and he briefly alludes to the conditions he found at their production plant. Soon after WWII, Armstrong started his career at the Celanese Corporation, which was to last until his retirement. He describes his functions as he progressed up the corporate ladder and also outlines his involvement with the establishment of the Research Triangle Institute.

INTERVIEWER

James J. Bohning holds the B.S., M.S., and Ph.D. degrees in chemistry, and has been a member of the chemistry faculty at Wilkes College since 1959. He was chair of the Chemistry Department for sixteen years, and was appointed chair of the Department of Earth and Environmental Sciences in 1988. He has been associated with the development and management of the oral history program at the Beckman Center since 1985, and was elected Chair of the Division of the History of Chemistry of the American Chemical Society for 1987.

TABLE OF CONTENTS

- 1 Childhood and Early Education
Born in Nebraska, family moved to Arizona soon after.
Father's failed attempt as a banker. Mother as
teacher
in small rural school. Agricultural prep school after
mother's death.
- 3 Undergraduate Education
Enters MIT, choice of chemistry as major.
Recollections of faculty. Support by part-time work.
Undergraduate research and experimental work. Effect
of the Depression.
- 7 Graduate Studies
Infrared and Raman spectroscopy of cyclopropane.
Instructor at MIT.
- 8 U.S. Rubber Company
Key researchers in U.S. Rubber Research Laboratory.
Study of rubber vulcanization and of polymerization.
Initiation of copolymerization mechanisms pursued by
Mayo, Walling and Lewis.
- 12 North American Rayon Company
Circumstances of move during WWII, conditions at
plant.
- 14 Celanese Corporation
Establish quality control functions. Move to research
laboratories at Summit, N.J. and then to Charlotte
N.C.
as technical director, textile division. Role in
formation of Research Triangle Institute. Transfer to
head office, New York and progress to Senior Vice-
President, Research.
- 20 Notes
- 21 Index

NOTES

1. A. A. Noyes and M. S. Sherrill, A Course of Instruction in Chemical Principles, 8th edition (Boston: Thomas Todd Company, 1921).
2. H. W. Underwood, Problems in Organic Chemistry (New York: McGraw-Hill, 1926).
3. L. Harris, A. A. Ashdown and R. T. Armstrong, "Cyclopropane; its Raman Spectrum and Polymerization by Ultraviolet Light," Journal of the American Chemical Society, 58 (1936): 852-853. G. W. King, R. T. Armstrong and L. Harris, "Vibrational Levels of Cyclopropane," ibid., 58 (1936): 1580-1584.
4. P. G. Stevens, W. E. Higbee and R. T. Armstrong, "Influence of Branched Chains on Optical Activity; Configuration of Propyl-t-butylcarbinol; Rotatory Power and Chemical Character," Journal of the American Chemical Society 60 (1938): 2658-2660.
5. Letter; Frank R. Mayo to Robert T. Armstrong, 15 November 1947. BCHOC Oral History Research file #0011. Acknowledgement is included verbatim in the following paper.
F. M. Lewis, C. Walling, W. Cummings, E. R. Briggs and F. R. Mayo, "Copolymerization. IV. Effect of Temperature and Solvents on Monomer Reactivity Ratios," Journal of the American Chemical Society, 70 (1948): 1519-1523.
6. Robert T. Armstrong and Edwin J. Hart, "Treatment of Rubber," U.S. Patent 2,324,186, issued 13 July 1943 (application filed 16 January 1941). Robert T. Armstrong, "Anti-Flex-Cracking Agent," U.S. Patent 2,334,470, issued 16 November 1943 (application filed 19 December 1940). Edwin J. Hart and Robert T. Armstrong, "Treatment of Rubber," U.S. Patent 2,361,543, issued 31 October 1944 (application filed 6 November 1941). Robert T. Armstrong, "Vulcanization Accelerators," U.S. Patent 2,382,769, issued 14 August 1945 (application filed 20 June 1942). Robert T. Armstrong, "Polymerization of Maleic Anhydride and Methallyl Alkyl Ethers," U.S. Patent 2,415,400, issued 11 February 1947 (application filed 27 August 1943). Robert T. Armstrong, "Preparation of Dialkenyl Sulfides," U.S. Patent 2,446,072, issued 27 July 1948 (application filed 11 April 1945).

INDEX

A

Accelerators, rubber vulcanization, 11
Alien Property Custodian, 13, 14
Amines, 6
Anti-oxidants, 6, 11
Armstrong, William D. (father), 1
Armstrong, Cole A. (brother), 1, 2, 3
Ashdown, Avery A., 5, 7
AT&T, 1, 3

B

Baker, William O., 9
Bell Telephone Laboratories, Murray Hill, N.J., 9
Boston, Massachusetts, 2
Boston English High School, 2, 3
Bowie, Arizona, 1
Butadiene, 9

C

Celanese Corporation, 14, 15, 17
Chadron, Nebraska, 1
Champion Petroleum Company, 18
Charlotte, N.C., 15, 16
Chemstrand Corporation, 17
Chicago, University of, 10
Chicle, 6
Cody, Nebraska, 2
Cole, Alice W. (mother), 1, 2
Colorado Agricultural College, 2
Copolymerization, 11
Cumberland, Maryland, 14, 17
Cyclopropane, 7, 8

D

Department of Agriculture, 7
Depression, the Great, 6
Dreyfus, Camille, 15,
Dreyfus Foundation, Camille and Henry, 17
du Pont de Nemours & Co., E. I., Inc., 8, 9
Duke University, 16
Durham, N.C., 16

E

Eastman Kodak Company, 8
Elizabethton, Tennessee, 13

F

Fiber, acetate, 14
Fiber Industries Corporation, 18

Filtration, 14
Fluorine, 6
Fort Collins, Colorado, 2, 3

G

Gerke, Roscoe, 8, 10, 12
Gibbons, Willis, 9, 10
GRS, 9
Guest, Romeo, 16
Gutta percha, 6

H

Hamilton, Leicester F., 5
Harris, Louis, 7
Hazell, Ernest, 11
Herbert, George, 17
Hill, Watts, 16
Hodges, Luther, 16
Huntress, Ernest H., 5

I

ICI [Imperial Chemical Industries], 18
Infrared spectroscopy, 7
Isomerization, 6
Isomers, 8

J

Johns Hopkins University, 9
Jordan, Hubert F., 11

K

Keyes, Frederick, 8
Kharasch, Morris S., 9
King, Gilbert W., 7

L

Lewis, Frederick M., 10
Loveland, Colorado, 2

M

Mallinckrodt Chemical Works, 9
Mayo, Frank R., 10, 11, 12
MIT [Massachusetts Institute of Technology], 1, 2, 3, 4, 5, 6, 8,
17
Mooney, Melvin, 9, 11
Mullikan, Samuel P., 5, 6

N

Narrows, Virginia, 15, 17
Naugatuck Chemical Company, 11

New product development, 16
New York, N.Y., 14, 15, 16, 17
Newark (N.J.) Armory, 12
Nitrites, 6
North American Rayon Company, 13, 14
North Carolina, University of, Chapel Hill, 16
Nylon, 9, 11

O

Olga, Arizona, 1
Optical Activity, 8
Oxidation, 6

P

Parshall, Maxwell, 3, 4, 7
Passaic, N.J., 10
Patents, 14
Pauling, Linus C., 4
Pearson, Henry G., 4
Phelan, Joseph W., 4
Pilot plant, 14, 16
Polyester, 9
Polyethylene, 11
Polyethylene terephthalate, 11
Propylene, 8

Q

Quality control, 15, 16

R

Raman spectroscopy, 7
Rayon, 10
Research Triangle Institute, 16, 17
Robinson, Archer T., 4
Rock Hill, S.C., 17
Ruhoff, John R., 9
Rubber, synthetic, 9, 14

S

Schneider, George, 15
Schumb, Walter C., 6
Sherrill, Miles S., 5
The Sherwin-Williams Company, 10
Simpson, George, 16
Smallwood, Hugh M., 9
Smith, H. Monmouth, 4
Spectroscopy, infrared, 7
Spectroscopy, Raman, 7
Spinning, fiber, 14
Standard Oil of New Jersey, 6
Staudinger, Hermann, 5

Sulfur hexafluoride, 6
Sulfur/olefin reactions, 9, 10
Summit, N.J., 15

T

Tawney, Pliny O., 10, 11
ter Horst, William P., 11
Tire cord, 10, 13

U

Underwood, H. W., 5, 6
U.S. Navy, 10, 12, 13, 14
U.S. Rubber Company, 2, 8, 9, 10, 11, 14

V

Vulcanization, 9

W

Walling, Cheves, 10, 11, 12
Wetting agent, 13
Wiesner, Jerry, 17
Wilson, E. Bright, 7
Wrigley Chewing Gum Company, 6

Y

Yarn, pigmented, 14