

CHEMICAL HERITAGE FOUNDATION

CHARLES P. SMYTH

Transcript of an Interview  
Conducted by

Jeffrey L. Sturchio and Ronald E. Doel

in

Princeton, New Jersey

on

30 May 1986

(With Subsequent Additions and Corrections)

THE BECKMAN CENTER FOR THE HISTORY OF CHEMISTRY  
Oral History Program

RELEASE FORM

This document contains my understanding and agreement with the Beckman Center for the History of Chemistry with respect to my participation in a tape-recorded interview conducted by Jeffrey L. Sturchio and Ron Doel on 30 May 1986.

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

1. The tapes and corrected transcript (collectively called the "Work") will be maintained by the Beckman Center and made available in accordance with general policies for research and other scholarly purposes.
2. I hereby grant, assign, and transfer to the Beckman 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 Beckman 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 Beckman Center.
4. I wish to place the following conditions that I have checked below upon the use of this interview. I understand that the Beckman 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) Emily V. Smyth wife & Pres./Rep.

(Date) October 24, 1991

This interview has been designated as **Free Access**.

One may view, quote from, cite, or reproduce the oral history with the permission of CHF.

**Please note:** Users citing this interview for purposes of publication are obliged under the terms of the Chemical Heritage Foundation Oral History Program to credit CHF using the format below:

Charles P. Smyth, interview by Jeffrey L. Sturchio and Ronald E. Doel at Princeton, New Jersey, 30 May 1986 (Philadelphia: Chemical Heritage Foundation, Oral History Transcript # 0042).



Chemical Heritage Foundation  
Oral History Program  
315 Chestnut Street  
Philadelphia, Pennsylvania 19106



The Chemical Heritage Foundation (CHF) serves the community of the chemical and molecular sciences, and the wider public, by treasuring the past, educating the present, and inspiring the future. CHF maintains a world-class collection of materials that document the history and heritage of the chemical and molecular sciences, technologies, and industries; encourages research in CHF collections; and carries out a program of outreach and interpretation in order to advance an understanding of the role of the chemical and molecular sciences, technologies, and industries in shaping society.

CHARLES P. SMYTH

1895 Born in Clinton, New York on 10 February  
1990 Died in Bozeman, Montana on 18 March

Education

1916 A.B., chemistry, Princeton University  
1917 A.M., chemistry, Princeton University  
1921 Ph.D., chemistry, Harvard University

Professional Experience

1917 Chemist, National Bureau of Standards  
U.S. Army  
1918 2nd Lieutenant, Ordnance Reserve Corps  
1918 2nd Lieutenant, Chemical Service Section  
1918 1st Lieutenant, Chemical Warfare Service  
Princeton University, chemistry department  
1920-1923 Instructor  
1923-1927 Assistant Professor  
1927-1938 Associate Professor  
1938-1958 Professor  
1958-1963 David B. Jones Professor of Chemistry  
1963-1990 David B. Jones Professor of Chemistry Emeritus

Honors

1947 Medal of Freedom, U.S. Army  
1954 Nichols Medal, New York Section, American Chemical  
Society  
1970 Honorary Degree (Science honoris causa) July 23  
University of Salford, Salford, England

## ABSTRACT

Charles P. Smyth begins the interview by naming the many scientists in his family and discussing his undergraduate education at Princeton, with descriptions of the curriculum, faculty and facilities. He then describes his tenure at the National Bureau of Standards and the Chemical Warfare Service, where he worked on electroplating and poison gas during the First World War. Smyth continues with a discussion of his Ph.D. training at Harvard, where his thesis examined thallium amalgams. He then describes his return to Princeton as an instructor, his early teaching and students, and the options he considered for research projects. His work on dipole moment leads to an important discovery about benzene ring structure that proves correct the Kekulé model. He then discusses the funding situation at Princeton and his first visits to Europe, where he meets Peter Debye, Karl Bonhöffer and James Franck. Smyth next discusses department colloquia at Princeton, attempts to recruit Debye and Enrico Fermi to Princeton and changes in the chemical field during the 1920s and 1930s, including the emergence of chemical physics. The interview ends with a discussion of Smyth's work on deuterium and the Manhattan Project. In the appendix, "Scientist in a Jeep," Smyth narrates a detailed account of his work in the U.S., France and Germany with the ALSOS Mission, which investigated Nazi Germany's scientific capabilities at the end of the Second World War.

## INTERVIEWERS

Jeffrey L. Sturchio received an A.B. in history from Princeton University and a Ph.D. in the history and sociology of science from the University of Pennsylvania. He was Associate Director of the Beckman Center for the History of Chemistry from 1984 to 1988, and has held teaching appointments at the New Jersey Institute of Technology, Rutgers University, and the University of Pennsylvania as well as a fellowship at the Smithsonian Institution's National Museum of American History. After a sojourn on the senior staff of the AT&T Archives, Dr. Sturchio joined Merck & Co., Inc. as Corporate Archivist in June 1989. He is currently Director, Science & Technology Policy, in the Public Affairs Department at Merck.

Ronald E. Doel received a B.A. in english and astronomy from Northwestern University, a M.A. in American Studies from Bowling Green State University, and a Ph.D. in history from Princeton University. He was Postdoctoral Historian at the Center for the History of Physics from 1990-1993, and Postdoctoral Fellow at the Smithsonian Institution in 1993-94. He has taught history and history of science at the University of Maryland.

## TABLE OF CONTENTS

- 1 Family and Early and Undergraduate Education  
Many family members are scientists. Attends the Lawrenceville school and Princeton University in pursuit of a broad education, and enters the chemistry department. Discusses classmates, professors, curriculum and facilities at Princeton.
- 5 National Bureau of Standards and Chemical Warfare Service  
Works on an electroplating project as part of the war effort. Discusses colleagues at the National Bureau of Standards. Becomes second lieutenant in the Army Ordnance Department and works on poison gas. Discusses safety standards and toxic substances. Names the best physical chemists in that era.
- 9 Graduate Education at Harvard University  
Attends Harvard after World War I. Pursues thesis on thallium amalgam project with T. W. Richards. Discusses colleagues and faculty at Harvard.
- 13 Early Career at Princeton University  
Accepts instructorship at Princeton. Teaches freshman lab while completing thesis. Discusses relationships with Karl Compton and William Foster. Research program options of infrared, atom smashing or dielectrics. Students. Chemical physics versus physical chemistry. Early publications on dipole moment. Research expenses, research support, and consulting. Instrument building.
- 21 Early Voyages to Europe  
Travels to Bucharest as the American delegate to the International Union of Pure and Applied Chemistry. Meets Peter Debye and visits his lab in Leipzig. European colleagues Karl Bonhöffer and James Franck.
- 23 Princeton University  
Studies quantum mechanics with Eugene Wigner. Departmental colloquia with Niels Bohr and Niels Bjerrum. Collaboration with Henry Eyring. Princeton attempts to recruit Debye and Enrico Fermi. Publications on resonance shifts in organic molecules. Collaboration with Kodak.
- 29 Chemical Physics in the 1920s and 1930s  
Princeton is a center for chemical physics in the interwar years. Edits Journal of Chemical Physics. Section for Chemical Physics is started in the American Chemical Society. Organizes a symposium on dielectrics. Students in the interwar years. Deuterium research and the Manhattan Project.

- 37 Appendix: "Scientist in a Jeep:" the ALSOS Mission  
Joins the ALSOS Mission and begins work at the  
Pentagon. Difficulties in leaving for Europe.
- 39 Paris  
Flight to Paris. Paris and the Royal Monceau hotel in  
wartime: accommodations, uniforms, food,  
transportation. German lessons with E. C. Kemble.  
Incendiary investigations with Louis Fieser at the  
Pouderie Nationale.
- 45 The Rhineland  
Crosses into Germany. First headquarters and Easter  
services at Aachen. Investigates the Physical  
Institute at Cologne. Explores the Rhine district.  
Explains that ALSOS civilian scientists were unarmed.  
Crosses the Rhine at Frankfurt on a pontoon bridge.  
Interrogates Dr. Czerny. Searches for Schumacher.  
Cinema in Frankfurt, "wine liberation" in Aachen and  
squab near Cologne. Wetzlar, Giessen, Marburg and  
Kassel.
- 55 Göttingen  
Interrogates four prominent professors at the  
University of Göttingen and offered the rectorship of  
the university. Discovers headquarters of the German  
National Research Council at Merseburg. Finds German  
supply of heavy water at Osterode.
- 61 Leipzig  
Visits Debye's former lab in Leipzig. Interviews Hund  
and Doepple at the University of Leipzig. Recalls  
earlier visit to Leipzig when Hitler stayed in same  
hotel. Encounters Nazi tank column and finds supply of  
uranium yellow cake in Stassfurt. Interrogates Paul  
Harteck about his work on isotope separation. War  
ends. Visits Karl Bonhöffer, whose bishop brother was  
assassinated by the Nazis. Finds Gestapo scientific  
papers in buried urns in the Harz region.
- 70 Notes
- 72 Index

## NOTES

1. Hubert N. Alyea, interview by Jeffrey L. Sturchio and Ron Doel in Princeton, New Jersey, 22 and 30 May 1986; Beckman Center for the History of Chemistry, Transcript #0010.
2. Foreign Affairs. Volume 1 published in 1922; H. F. Armstrong editor from 1928.
3. See Beckman Center for the History of Chemistry oral history research file #0042 for a copy of undated typewritten autobiographical notes (pp.13).
4. T. W. Richards and C. P. Smyth, "Solid Thallium Amalgams and the Electrode Potential of Pure Thallium," Journal of the American Chemical Society, 44 (1922): 524-545; Richards and Smyth, "The Heat of Solution of Thallium in Dilute Thallium Amalgams," ibid., 45 (1923): 1455-1460.
5. A. Smith, Textbook of Elementary Chemistry (New York: Century Company, 1914).
6. W. Foster, Introduction to General Chemistry (Princeton, New Jersey: Princeton University Press, 1924).
7. C. P. Smyth, "The Electric Moments of Typical Organic Molecules," Journal of the American Chemical Society, 46 (1924): 2151-2166; Smyth and C. T. Zahn, "The Dielectric Constants of Ethane, Ethylene, Acetylene and Butylene, and the Symmetry of Unsaturated Bonds," ibid., 47 (1925): 2501-2506.
8. C. P. Smyth and S. O. Morgan, "The Electric Moments of Substituted Benzene Molecules and the Structure of the Benzene Ring," Journal of the American Chemical Society, 49 (1927):1030-1038; Smyth, Morgan and J. C. Boyce, "The Dielectric Polarization of Liquids. I. The Dielectric Constants and Densities of Solutions of the Chlorobenzenes in Benzene and in Hexane," ibid., 50 (1928): 1536-1560.
9. C. P. Smyth, "The Calculation of the Electric Moment of the Molecule of a Substance," Philosophical Magazine, [6] 45 (1923): 849-863; Smyth, "Electric Moment and Molecular Structure," ibid., 47 (1924): 530-544.
10. C. P. Smyth, "Some Applications of Electric Moments to Electronic Theories of Valence," Journal of the American Chemical Society, 51 (1929): 2380-2388.
11. Arnold O. Beckman, interview by Arnold Thackray and Jeffrey L. Sturchio in Philadelphia PA, 23 April and 23 July 1985; Beckman Center for the History of Chemistry, Transcript #0014.



12. C. P. Smyth and E. W. Engel, "Molecular Orientation and the Partial Vapor Pressures of Binary Mixtures. I. Systems Composed of Normal Liquids," Journal of the American Chemical Society, 51 (1929): 2646-2660; Smyth and Engel, "II. Systems Containing an Alcohol," ibid., 2660-2670.
13. H. Eyring, "Steric Hindrance and Collision Diameters," Journal of the American Chemical Society, 54 (1932): 3191-3203; C. P. Smyth, "The Polarities of Covalent Bonds," Journal of the American Chemical Society, 60 (1938): 183-189; Smyth, "Induction, Resonance and Dipole Moment," ibid., 63 (1941): 57-66.
14. C. P. Smyth and W. S. Walls, "The Dipole Moments and Structures of Certain Long-Chain Molecules," Journal of Chemical Physics, 1 (1933): 200-204.
15. L. G. S. Brooker, R. H. Spague, C. P. Smyth and G. L. Lewis, "Color and Constitution. I. Halochromism of Anhydronium Bases Related to the Cyanine Dyes," Journal of the American Chemical Society, 62 (1940): 1116-1125.
16. J. H. Van Vleck, The Theory of Electric and Magnetic Susceptibilities (New York: Oxford University Press, 1932).
17. G. A. Hulett, E. Mack and C. P. Smyth, "The Moisture Content of Some Typical Coals," American Journal of Science, series 4, 45 (1918): 174-184.
18. C. P. Smyth and W. O. Baker, "The Rotation of Some Long Molecules in the Solid State," Journal of Chemical Physics, 5 (1937): 666.
19. William O. Baker, interview by Jeffrey L. Sturchio and March Goldstein at AT&T Bell Laboratories, 23 May and 18 June 1985; Beckman Center for the History of Chemistry, Transcript #0013.
20. Eucken, Arnold, Fundamentals of Physical Chemistry (New York: McGraw Hill, 1925).

## INDEX

### A

Aachen, Germany, 43, 45, 46-47, 48, 50, 53, 54, 56  
    Carolingian chapel, 47  
    "Little Monceau," 53, 54  
    Technische Hochschule, 50  
Adams, Roger, 12  
Alkali metals, 60  
Alkaline solution, 61  
Allied Armies, 37  
ALSOS Mission, 34, 35-36, 39, 42-45, 48  
    Aachen headquarters, 46-47, 50, 52  
    civilian status, 49-50  
    colleagues, 37, 40, 43, 45, 57, 60, 63  
    discovers German supply of heavy water, 60-61  
    discovers Gestapo papers, 68-69  
    discovers Reichsforschungsrat documents, 57  
    Göttingen headquarters, 55-57  
    Heidelberg headquarters, 56  
    interrogations, 52, 56, 60, 66  
    origin of name, 41  
    Paris operations, 41-43  
    principle of driving fast, 59  
    recruited to, 37  
    Washington, D.C. operations, 38  
Alyea, Hubert N., 2, 29  
American Chemical Society, 30  
American Journal of Science, 31  
American Philosophical Society, 18  
American Physical Society, 30  
American University, 6, 9  
Ammonia synthesis, 62  
Armstrong, Hamilton F., 2  
Arras, France, 46  
Arrhenius, Svante, 3  
Atom smashing, 14  
Azores Islands, 35, 40

### B

Baker, William O., 16-17, 31-33  
Baltimore, Maryland, 8, 39  
Bancroft, Wilder D., 30  
Barrier research, 34  
Bates, Allan A., 46, 49, 50  
Battle of the Bulge, 37, 47  
Bauman, Carl A., 40  
Beckman, Arnold O., 20  
Bell Telephone Laboratories, 16, 19, 20, 33  
Belsen concentration camp, 58  
Benzene ring, 1  
Benzene structure, 17, 27  
Berlin, Germany, 55, 68  
Betz, Johann A., 56

Bjerrum, Niels, 25  
Black Sea, 21  
Blake, Robert W., 64, 65  
Blum, William, 5  
Bodenstein, Max, 3  
Bohr, Niels H. D., 24-25  
Bonbright and Company, 23  
Bonhöffer, Dietrich, 27, 68  
Bonhöffer, Karl F., 22, 26-27, 62, 67-68  
Bonn, Germany, 45, 49  
Bothe, Walther, 68  
Boyce, Joseph C., 15, 31  
Bradley, Omar N., 55  
Brahms, Johannes, 53  
Braunschweig, Germany, 64  
Brooker, L. G. S., 28  
Bryn Mawr College, 12  
Bucharest, Romania, 21  
Bunsengesellschaft (German Society of Physical Chemistry), 52  
Bureau of Mines, Pittsburgh, 2, 19

## C

C-54 (DC-4), 39-40  
California, University of, at Berkeley, 9, 29  
California Institute of Technology (Caltech), 20, 29  
Cambridge, England, 6  
Cambridge, Massachusetts, 9, 10, 11  
    Naval training unit, 10  
Carnegie, Andrew, 4  
Carver, Emmett, 28  
Celle, Germany, 57-59, 66  
Charlemagne, 47  
Charles River, Cambridge, 10  
Chemical physics, 16, 29-30, 62  
Chemical Warfare Service, 1, 2, 6-7, 9, 42  
Chicago, Illinois, 15, 17, 23, 28  
Cincinnati, University of, 31  
    Oesper Professorship, 31  
Clemenceau, Georges, 2  
Clinton, New York, 1  
Clusius, --, 68  
Cockcroft, Sir John D., 67  
Colby, Walter F., 57  
Cologne, Germany, 45, 46, 47-48, 53, 54  
Cologne University  
    Chemical Institute, 48, 54  
    Physical Institute, 48  
Columbia University, 1, 8  
Compton, Karl T., 6, 14, 16, 26, 34, 37  
Conant, James B., 7, 12, 17  
Connecticut College, 1  
Cooke, Lester, 15  
Coolidge, Albert Sprague, 11  
Cornell University, 62

Coward, Noel P., 42  
Craig, William M., 11  
Crossley, Moses L., 25  
Cyanide, 5, 6  
Cyclohexane ring, 17  
Cyclotron, 66  
Czerny, Marianus, 52

## D

Daniels, Farrington, 10  
Dayton, Ohio, 56  
Debye, Peter, 16, 21-22, 26, 62  
Deuterium, 33  
Deuterium oxide, 61  
Dielectrics, 15, 16, 18, 30, 31, 32, 34  
    constants of gases, 15  
    constants of liquids, 15  
Dipole moments, 16, 17-18, 27, 28  
Doepple, --, 63  
Dollfuss, Engelbert, 64  
Donnan, Frederick, 3  
du Pont de Nemours & Co., E. I., Inc., 31  
Düren, Germany, 49

## E

Eastman Kodak Company, 28  
Eidgenössische Technische Hochschule (ETH), Zürich, 21, 26  
Eisenhower, Dwight D., 38  
Elbel, A., 60  
Electroplating, 5  
Estonia, 61  
Eucken, Arnold, 56, 57  
    Fundamentals of Physical Chemistry, 56  
Eyring, Henry, 24, 25-26, 27, 28-29, 30

## F

Faraday Society, 3  
Farben, I. G., 60-61  
Fascism, Italian, 26  
Fermi, Enrico, 26  
Fieser, Louis F., 43-44  
Fisher, --, 18  
Fisher, Russell A., 66  
Flying fortresses, 55  
Fontaine, Lynne, 44  
Forbes, George S., 12  
Foreign Affairs, 2  
Foster, William, 14  
Franck, James, 22-23  
Frankfurt, Germany, 48, 51-53, 54  
French Revolution, 43  
Frick, Henry Clay, 4  
Friedrichsbrunn, Germany, 67  
Furman, N. Howell, 5

## G

Gehrig, Lou, 30  
General Electric Company, 15  
General Radio Company, 18  
George V, King of Great Britain, 3  
Gerlach, Walther, 68  
Giessen, Germany, 54  
Goebels, Joseph, 63  
Göttingen, Germany, 22-23, 55-57, 60, 61, 64, 65, 66, 67  
Göttingen, University of, 56, 57  
    Institute of Physical Chemistry, 56  
Goudsmit, Samuel, 37, 45  
Great Depression, 33  
Groth, --, 59  
Groves, Chester, 20  
Groves, Leslie R., 41  
Gulf of St. Lawrence, 39

## H

Haber, Fritz, 27, 62  
Hahn, Otto, 68  
Halle, Germany, 61  
Hamburg, Germany, 66, 67  
Hamburg, University of, 65  
    Chemical Institute, 66  
    Harteck's Institute, 65  
    Physical Institute, 66  
Hannay, N. Bruce, 16-17  
Hanover, Germany, 59  
Harteck, Paul, 65-67, 68  
Harvard University, 9-12, 28, 30, 43  
    Physical chemistry department, 10  
    Wolcott Gibbs Laboratory, 10  
Harz Mountain region, Germany, 27, 60, 62, 67-68  
Hayworth, Rita, 53  
Heavy water, 60, 68  
Heidelberg, Germany, 44, 47, 56  
    Philosophenweg, 47  
Heisenberg, Werner K., 62-63, 68  
Heitler, Walter, 22  
Herold, Paul, 60  
Herring, W. Conyers, 32  
Hirschfelder, Joseph O., 29  
Hitler, Adolph, 26, 27, 49, 51, 58, 63-64, 68  
    July Revolution against, 27, 68  
Holleman and Wolff Company, 61  
Holy Roman Empire, 47  
Hulett, George A., 2, 5, 19, 31  
    plays the violin, 3  
Hund, Friedrich, 63, 68

## I

Illinois, University of, 20  
Illinois Institute of Technology, 15  
Infrared spectroscopy, 14  
Insulation breakdown, 15  
International Union of Pure and Applied Chemistry, 21  
Isotope separation, 59, 66  
Istanbul, Turkey, 21

## J

Jensen, William B., 31  
Jones, Lauder W., 9, 17  
Jost, --, 68  
Journal of the American Chemical Society, 9  
Journal of Chemical Physics, 29-30  
Journal of Physical Chemistry, 30  
Jürich, Germany, 49

## K

Kaiser Wilhelm Institute for Physics, 62  
Kassel, Germany, 55  
Kekulé model, 17, 24  
Kekulé von Stradonitz, Friedrich August, 17  
Kemble, Edwin C., 43  
Kharasch, Morris S., 17, 28  
Kirkwood, John G., 30  
Kohler, Elmer P., 12  
Krefeld, Germany, 48  
Krepelka, Henry, 11-12

## L

Ladenberg, Rudolf W., 26  
Lagos, Portugal, 40  
Lamb, Arthur B., 9  
Langley Field, Virginia, 56  
Langmuir, Irving, 24  
Lavoisier, Antoine-Laurent, 43  
Lawrenceville school, 1, 6  
League of Nations, 2  
Leipzig, Germany, 21-22, 26, 27, 53, 56, 61-63, 67  
    Fair hall, 63  
    Gewandhaus Orchestra, 53  
    Hotel Hauffe, 63  
Leipzig, University of, 62  
    Institute of Physical Chemistry, 62  
    Institute of Theoretical Physics, 62  
Lenard, Philipp, 27, 62  
Leuna, Germany, 60, 61  
Lewis, George L., 31  
Lewis, Gilbert N., 7, 8, 9-10, 24, 31  
Lindau, Germany, 57  
Lindbergh, Charles A., 42  
Liverpool, University of, 3

Lloyd's of London, 39  
London, England, 62  
Loomis, Alfred L., 23  
Lüneberg, Germany, 67  
Lunt, Alfred, 44

## **M**

Mack, Edward, Jr., 31  
Magie, William F., 14  
Mainz, Germany, 46  
Manhattan Project, 33-34, 37, 41  
Marburg, Germany, 54  
Massachusetts Institute of Technology (MIT), 1, 15, 32, 34  
    Radiation Laboratory, 34, 37  
McCay, LeRoy W., 3, 29  
Mees, C. E. K., 28  
Merck & Company, Inc., 9  
Mercury, 4, 6, 10  
Merseburg, Germany, 60  
Michigan, University of, 57  
Mont St. Michel, 35, 40  
Montgomery, Bernard L., 45  
Morgan, Stanley O., 16-17, 19, 27, 31  
Morman church, 25, 28  
Mudd, Stuart, 2  
Muenchen-Gladbach, Germany, 49  
Multiple warhead, 57

## **N**

National Academy of Science, 16  
National Bureau of Standards, 2, 5-6  
Nazis, 12, 22, 27, 37, 42, 52-53, 55, 58, 62, 63-65, 68  
    Brown Shirts, 63  
    Gestapo, 61, 68  
    Saxon Division, 63  
    Schutzpolizei, 64  
    S.S., 49, 55, 57, 67  
New Brunswick, Canada, 25  
New York, New York, 39  
New York Academy of Science, 30  
New York Yankees, 30  
Nobel Institute, 3  
Nobel laureates, 11, 27, 30, 62  
Northeim, Germany, 57  
Northwestern University, 66  
Noyes, Arthur A., 8  
Noyes, William A., Jr., 33  
Nuclear bomb, German, 52, 63, 66  
Nuclear fission, 68

## **O**

Oesper, Peter F., 31  
Office of Naval Research, 18, 33, 67  
Office of Scientific Research and Development, 38

Office of Strategic Services (OSS), 41  
Ohio State University, 31  
Onsager, Lars, 30  
Oppenheim, Germany, 46  
Organic chemistry, 9, 12, 25, 43  
Osenberg, Werner, 57  
Osram Company, 68  
Osterode, Germany, 61, 64  
Ostwald, Wilhelm, 26

## P

Paris, France, 31, 34, 35, 38, 40-45, 50, 54, 59, 67  
    Arc de Triomphe, 40, 41, 42  
    Avenue Hoch, 40  
    jail, 43  
    Metro, 43  
    Royal Monceau, 40, 41-42, 47  
    Tomb of the Unknown Soldier, 42, 43  
    wood-burning cars, 42  
Partial vapor pressure, 14  
Pash, Boris T., 45  
Patton, George S., 44-45, 46  
Pauling, Linus C., 21  
Pease, Robert N., 5  
Pennsylvania, University of, 2  
Pentagon, 37-38  
Perrin, Jean B., 14  
Perrott, George, 4  
Philadelphia Orchestra, 3  
Philosophical Magazine, 17  
Physical Chemistry, 1, 2, 3, 8, 16, 17, 25, 27, 29, 34, 62  
Pittsburgh, Pennsylvania, 2, 46  
Pouderie Nationale, 43  
Prague, Czechoslovakia, 12  
Prague, University of, 12  
Prandtl, Ludwig, 56  
Precision condenser, 18  
Princeton University, 1-5, 8, 9, 10, 12, 13, 15, 16, 23-30,  
    31-34, 37, 52, 60  
    chemical curriculum, 3  
    chemistry department, 3, 4, 13  
    Fine Hall, 4  
    Frick Chemistry Laboratory, 4, 23, 26  
    graduate requirements, 32  
    interdepartmental cooperation, 20  
    John C. Green School of Science, 4  
    Nassau Tavern, 44  
    Palmer Laboratory, 4  
    physical chemistry at, 29  
    physics department, 4  
    recruitment, 26  
    research funding, 18, 19  
Public Service Corporation of New Jersey, 18, 19



## Q

Quantum theory, 24

## R

Radar, 34, 37

Red Cross, 47

Reichsforschungsrat (German National Research Council), 57, 60

Remagen, Germany, 50

Rennselaer Polytechnic Institute, 67

Resonance charge shifts, 27-28

Rhineland, 45-54

Rhine River, 44, 45, 46, 48, 49, 50, 51, 54

Rhine wine, 53

Rice, -- , 14

Richards, Theodore W., 8, 9-12

Richards, William T., 11, 23

Rockwell, Norman, 44

Roosevelt, Franklin D., 56

Royal Society, 22, 62

Ruhr River, 45, 46

Russell, Henry N., 20

Ruth, Babe, 30

Rutherford, Sir Ernst, 6

## S

Sack, Heinrich, 62

St. Petersburg, Florida, 30

Saipan, 37

Salzburg, Austria, 64

Schumacher, Hans Joachim, 52

Seitz, Frederick, 32

Sevrens-Livry, France, 43

Shaw, George Bernard, 44

"Arms and the Man," 44

Siegfried line, 46

Signal Corps, 67

Smith, Alexander, 8

textbook, 13-14

Smyth, Charles P.

atomic structure and radioactivity course at Princeton, 23

considers Berkeley postdoc, 9

early education, 1

family, 1

father, 1, 6

father's first cousin, 1

freshman lecture at Princeton, 13, 23

instructorship at Princeton, 12

made first lieutenant, 2

made second lieutenant, 2, 6

molecular structure course at Princeton, 23

graduate education, 10

Ph.D. oral exams, 12

Ph.D. thesis, 10, 13

recruited to the ALSOS Mission, 37

students, 15, 16-17  
undergraduate education, 1-5, 13  
Smyth, Frederic Hastings (cousin), 1  
Smyth, Henry DeWolf (brother), 1, 6  
Specific heats, 1  
Spectroscopy, 52  
Spedding, Frank H., 33  
Speight, Monty, 62  
Spitfires, 58  
Sponer, Herta, 23  
Standard Oil of Indiana, 7, 60  
Stark, Johannes, 27, 62  
Stark effect, 27  
Stassfurt, Germany, 60, 64, 65  
Stephenville, Newfoundland, 39  
Stolberg, Germany, 60  
Stollwerk, Germany, 54  
Stoops, William N., 31  
Strasbourg, Germany, 35, 38, 45  
"Superior Charlie," 46

## **T**

Taylor, Sir Hugh S., 3, 13, 17, 18, 19, 23, 24, 28, 29, 34, 60  
Teller, Edward, 22  
Telschow, --, 56  
Thallium amalgams, 10, 24  
Thermodynamics, 10, 14  
Tolman, Richard C., 7-8  
Troy, New York, 67  
Tungsten, 15  
Tuxedo Park, New York, 23  
Typhus, 58

## **U**

Ultracentrifuge, 16  
United States Airforce Reserve, 40  
United States Army, 35  
    Ordnance Department, 2, 6, 7  
United States Navy, 67  
United States State Department, 38  
United States War Department, 33  
Uranium, 65  
Urey, Harold C., 30

## **V**

Van Vleck, John H., 30-31  
Vassar College, 1  
Verdun, France, 46  
Von Neuman, John, 24

## **W**

Walter, Bruno, 53  
Wanzleben, Germany, 60  
Washburn, Edward W., 8

Washington College, 32  
Washington, D. C., 5, 6, 8, 37-39, 41  
Wasserburg, Germany, 57  
West, Andrew F., 32  
Westinghouse Laboratories, 46  
Wetzlar, Germany, 54  
Whitmore, Frank "Rocky" C., 12  
Wigner, Eugene P., 24  
Williams, John W., 16  
Wilson, Robert E., 7  
Wisconsin, University of, 16  
Wiswall, Richard H., 31  
World War I, 4, 7, 42, 46, 56, 62  
    Armistice, 9  
World War II, 7, 18, 29, 32  
Wright Field, Dayton, Ohio, 56

## **Z**

Zahn, Charles T., 15  
Zinc electroplating, 5, 6  
Zürich, Switzerland, 21, 22