

# C. Judson King

of UC Berkeley

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In the middle of the UC Berkeley campus, next to the Main Library, South Hall is the last surviving building from the original campus, founded about 135 years ago. A tiny tree-shaded appendix to this venerated classical building houses Berkeley's Center for Studies in Higher Education, directed by C. Judson King, former provost and senior vice president of academic affairs of the 10-campus University of California, and longtime professor of chemical engineering at Berkeley.

Jud came to Berkeley in 1963 as assistant professor of chemical engineering, following a doctoral degree from MIT and a subsequent short appointment as director of the MIT chemical engineering practice school station at what was then Esso (now Exxon) in New Jersey. His undergraduate degree is from Yale.

Starting with his MIT doctoral dissertation on gas absorption, Jud has devoted much of his professional career to separation processes. His teaching and research activities have been primarily concerned with separation of mixtures, with emphasis on liquid-liquid extraction and drying. As a consultant to Procter & Gamble, he contributed to the technology of making instant coffee. His lifelong activities in hiking and camping stimulated Jud's interest in the manufacture of freeze-dried foods (e.g., turkey meat) to minimize the weight of his hiking backpack.

Jud is internationally known not only for his many research publications but also, and even more, for his acclaimed textbook *Separation Processes* (McGraw-Hill, second edition 1980) that is used in standard chemical engineering courses in the U.S. and abroad.



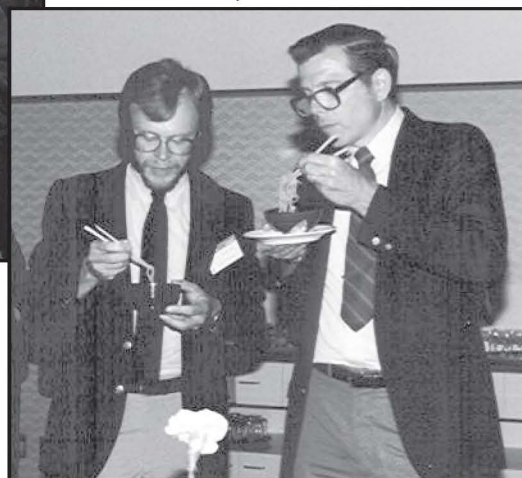
Born into an army family in Ft. Monmouth, NJ, in 1934, Jud moved about in the military world during his early years. He developed an interest in camping and mountaineering during that time, an avocation he has retained throughout his life. After high school in Alexandria (VA), higher education at Yale and MIT, and marriage to Jeanne (1957), Jud began his career at Berkeley in 1963.

While the concept of unit operations in chemical engineering is about 90 years old, when Jud started his professional career at Berkeley, about 40 years ago, the standard separation operations (distillation, extraction, absorption, etc.) were considered separate topics, each described by its own methodology. Through his research and teaching, and above all through



◀ *Jud and John Prausnitz after receiving Berkeley-Citation diplomas at the College of Chemistry commencement in May 2004.*

▼ *Jud (right) and Larry Genskow (of Procter & Gamble) at the International Drying Symposium in Kyoto (1984).*



his influential textbook, Jud showed that each of these separation operations is a special case of a unified technology that can be described by a general set of quantitative principles. Jud's book not only emphasizes the common aspects of various forms of separation technology; it also discusses convergence methods for computerized calculations, energy requirements, and rational criteria. First, for selecting an optimum separation method for a particular purpose, and second, for an optimized series of separation steps in an industrial chemical plant.

Jud's pioneering leadership in advancing the technology of separation processes is also indicated by the Separations Division of AIChE. He was the cofounder of that division 15 years ago.

A major part of Jud's research work has been concerned with freeze-drying—in particular, freeze-drying of foods, notably beverages such as coffee. A key problem in freeze-drying is retaining the volatile flavors while subliming ice. Further, it is extremely important to avoid collapse of the porous structure that results from sublimation; failure to prevent collapse makes it impossible to reconstitute the dried product by adding water. Similarly, for biological agents, collapse may cause the loss of biological activity. Jud and coworkers showed that collapse can be avoided by careful control of viscosity and by addition of suitable additives (excipients). In addition to foods, this work has also been of much help to guide freeze-drying of pharmaceuticals. In 1971, Jud published a book on the subject, *Freeze Drying of Foods* (CRC Press).

A second research area concerned extraction of carboxylic acids for recovery from dilute aqueous solutions. Such extraction is important not only for acetic acid but more recently, also for lactic acid that is used for making biodegradable polylactic acid. Jud and coworkers investigated the technology and economics of using suitable complexing agents (*e.g.*, amines) in suitable "inert" water-insoluble solvents. His research showed convincingly that the "inert" solvent plays a major role; in fact, it is *not* inert.

A third area of Jud's research has been directed at synthesis in plant design. Following the strong influence of the book *Transport Phenomena*

by Bird, Stewart, and Lightfoot (published in 1960), chemical engineering research in the universities was primarily directed at analysis, at detailed microscopic descriptions of chemical and physical processes. During the 20-year period starting about 1965, Jud was one of the few academics who gave attention to the logic of plant design—to establishing rational criteria and methods that can make plant design more of a science than an art.

A popular and highly effective teacher, Jud supervised a large number of M.S. and Ph.D. theses. The names and present affiliations of his former Ph.D. students are given in Table 1 on the following page.

Within a few years after his arrival in Berkeley in 1963, it became clear that in addition to his fine abilities in teaching and research, Jud had truly extraordinary talents in administration. He was appointed vice-chair of the Department of Chemical Engineering in 1967 and became chair in 1972, where he remained for nine years. During that time, Berkeley's Department of Chemical Engineering grew remarkably in size and stature. Since Jud's chairmanship, the National Research Council has consistently rated the Berkeley ChE department within the top three in the United States.

In 1981, Jud became dean of Berkeley's College of Chemistry, comprising two departments: chemistry and chemical engineering. Because the number of faculty and graduate students in chemistry is about three times the number in chemical engineering, Berkeley's world-famous Department of Chemistry has traditionally been the dominant part of the college. Jud was the first chemical engineer to become dean, a remarkable achievement because, all too often, academic chemists are reluctant to accept chemical engineers as equals. Because of his open fairness and his consistent good judgment, Jud was able to break that prejudice. In a sense, the election of chemical engineer Jud King in 1981 as dean of

the College of Chemistry is analogous to the election of Catholic John Kennedy in 1960 as president of the United States.

Jud's achievements in chemical engineering research and education have been recognized by numerous awards, as shown in Table 2.

During his deanship, Jud led a successful effort to build Tan Hall, a major building (completed in 1997) for research laboratories in synthetic chemistry and chemical engineering, including biotechnology. In 1982, Jud established a College of Chemistry Development Office for obtaining much-needed financial support from alumni and corporations. While

**TABLE 1**  
**Ph.D. Graduates Supervised by C. Judson King**

<i>Keith Alexander</i>	1983 Sr. VP, CH2M Hill, ret.; Joined Berkeley ChE Department as Executive Director, Product Development Program, 2005	<i>John P. Hecht</i>	1999 Procter & Gamble
<i>Daniel R. Arenson</i>	1988 Pfizer	<i>Scott M. Husson</i>	1998 Associate Professor, Chemical & Biomolecular Engineering, Clemson University
<i>Francisco J. Barns</i>	1973 Former Rector, National Autonomous University of Mexico	<i>Russell L. Jones</i>	1975 Aventis CropScience
<i>Prabir K. Basu</i> (with Scott Lynn)	1972 Searle	<i>Dilip K. Joshi</i>	1982 Pharmacia & Upjohn
<i>Carl P. Beitelshes</i> (with Hugo Sephton)	1978 E.I. DuPont de Nemours	<i>Theo G. Kieckbusch</i>	1978 Faculty of Chemical Engineering, Universidade Estadual de Campinas-UNICAMP, Brazil
<i>Richard J. Bellows</i>	1972 Richard Bellows Advanced Energy Systems LLC	<i>Romesh Kumar</i> (with Scott Lynn)	1972 Argonne National Laboratory
<i>John L. Bomben</i>	1981 SRI International	<i>Patricia D. MacKenzie</i>	1984 General Electric
<i>Robert R. Broekhuis</i> (with Scott Lynn)	1995 Air Products	<i>Donald H. Mohr</i>	1983 Chevron Texaco
<i>Charles H. Byers</i>	1966 IsoPro International; living in Mexico	<i>S. Scott Moor</i>	1995 Assistant Professor, Engineering, Indiana University-Purdue University, Fort Wayne
<i>Kumar Chandrasekaran</i>	1971 President, InSite Vision	<i>Curtis L. Munson</i>	1985 Chevron Texaco
<i>Daniel Chinn</i>	1999 Chevron Texaco	<i>M. Abdel M. Omran</i>	1972 Kuwait Industrial Park, Kuwait
<i>J. Peter Clark</i>	1968 Consultant	<i>Spyridon E. Papadakis</i>	1987 Professor, Food Technology, Technical Educational Institution of Athens, Greece
<i>Michael W. Clark</i>	1967 Dow Chemical, ret.	<i>N. Larry Ricker</i>	1978 Professor, Chemical Engineering, University of Washington
<i>Ian F. Davenport</i>	1972 Structure and Strategy Specialist, Commonwealth Private Bank, Australia	<i>William G. Rixey</i>	1987 Associate Professor, Civil & Environmental Engineering, University of Houston
<i>Jonathan P. Earhart</i>	1975 Hewlett-Packard	<i>Gary T. Rochelle</i>	1977 Professor, Chemical Engineering, University of Texas, Austin
<i>Tarric M. El-Sayed</i>	1987 Clorox	<i>Orville C. Sandall</i>	1966 Professor, Chemical Engineering, University of California, Santa Barbara
<i>Mark R. Etzel</i>	1982 Professor, Food Science and Chemical & Biochemical Engineering, University of Wisconsin, Madison	<i>John J. Senetar</i>	1986 Amoco
<i>Loree J. Fields (Poole)</i>	1989 Woodward-Clyde Consultants	<i>John N. Starr</i>	1991 EcoPLA Business Unit, Cargill
<i>Howard L. Fong</i> (with Hugo Sephton)	1975 Shell Development	<i>James H. Stocking</i>	1974 Broken Arrow, OK
<i>Douglas D. Frey</i>	1984 Professor, Chemical & Biochemical Engineering, University of Maryland, Baltimore County	<i>Janet A. Tamada</i>	1988 Alexza Molecular Delivery
<i>Antonio A. Garcia</i>	1988 Associate Professor, Bioengineering, Arizona State University	<i>Rodney E. Thompson</i>	1986 BioProcess Technology Consultants
<i>Terry M. Grant</i>	1988 Weyerhaeuser	<i>Roger W. Thompson</i>	1972 Max Kade Foundation
<i>C. Gail Greenwald</i>	1980 Chief Operating Officer, Caveo Technology	<i>Lisa A. Tung</i>	1993 Rohm and Haas
<i>Robert D. Gunn</i>	1967 Professor Emeritus, University of Wyoming; ret., St. George, UT	<i>Ernesto Valdes-Krieg</i> (With Hugo Sephton)	1975 IEGE, Mexico
		<i>David A. Wallack</i>	1988 3M
		<i>Jack Zakarian</i>	1979 Chevron Texaco



*Jud (right) launching the Tan Hall Project in 1983, shown here with Project Manager Herb Fusfeld and Oski, the UC Berkeley football mascot.*

such offices are now ubiquitous, 23 years ago it was a pioneering step to have such an office in a specific college in a state-supported institution. Jud correctly anticipated that in California (as elsewhere), state support for the university would seriously decline despite ever-increasing costs.

During his deanship, Jud started a new annual tradition. Every spring, the dean invites all college staff members to lunch to celebrate “Staff Appreciation Day.” At this lunch, also attended by many faculty, the dean warmly thanks all the staff for their devoted service that is essential to the college’s operation. He also recognizes individual staff members for outstanding service or for many years of service.

During Jud’s six successful years as dean, the top Berkeley administration noticed his outstanding administrative abilities. As a result, in 1987, Jud was appointed Berkeley’s provost for professional schools and colleges (Engineering, Law, Business, Chemistry, Social Welfare, Environmental Design, Natural Resources, Education, Optometry, Public Health, Public Policy, Journalism, and Library and Information Studies), a position directly under the Berkeley chancellor. One of his major tasks was to help define the role of agriculture on the Berkeley campus and to modernize agricultural sciences.

In 1994, the president of the University of California chose Jud to serve as vice provost for research, and in 1996 selected him to be his right-hand man as provost and senior vice president for academic affairs for the entire university system, including Berkeley, UCLA, UC Davis, UC Santa Barbara, and six more. In addition to many other duties, Jud had responsibility of programmatic oversight for the Department of Energy National Laboratories at Berkeley, Livermore, and Los Alamos.

As the university’s provost, Jud had many diplomatic challenges, including relations with the university’s often volatile Board of Regents concerning affirmative action with respect to student admissions and recruiting of faculty and staff. Further, it was his task to provide academic planning for how the university could accommodate an expanding population of college-bound Californians in the face of decreasing financial resources.

Because the president of the university is much occupied with the university regents, the governor, and the state Legislature in Sacramento, as well as with the federal government in Washington, with alumni, industrialists, labor unions, etc., it was Jud who had to “mind the store,” to take care of the university’s daily operations. Jud retired from this awesome administrative position in 2004.

## TABLE 2 Honors and Awards

- **The Electrochemical Society Lecture**, The Electrochemical Society, 1998.
- **Outstanding Alumnus**, Yale Science and Engineering Association, Yale University, 1998.
- **Award in Separations Science and Technology**, American Chemical Society, 1997.
- **Centennial Medallion**, American Society for Engineering Education, 1993.
- **Fellow**, American Association for the Advancement of Science, 1993.
- **Clarence G. Gerhold Award**, Separations Division, American Institute of Chemical Engineers, 1992.
- **Warren K. Lewis Award**, American Institute of Chemical Engineers, 1990.
- **Mac Pruitt Award**, Council for Chemical Research, 1990.
- **Award for Excellence in Drying Research**, International Drying Symposium, 1990.
- **Ninth Centennial Lecturer in Chemical Engineering**, University of Bologna, 1988.
- **Fellow**, American Institute of Chemical Engineers, 1983.
- National Academy of Engineering, 1981.
- **George Westinghouse Award**, American Society for Engineering Education, 1978.
- **William H. Walker Award**, American Institute of Chemical Engineers, 1976.
- **Food, Pharmaceutical and Bioengineering Division Award**, American Institute of Chemical Engineers, 1975.
- **Best Paper Award**, 15<sup>th</sup> National Heat Transfer Conference (with H.L. Fong and H.H. Sephton), 1975.
- **25<sup>th</sup> Annual Institute Lecturer**, American Institute of Chemical Engineers, 1973.
- Tau Beta Pi
- Sigma Xi

Jud’s remarkable administrative skills follow from his smiling, soft-spoken manner and from his uncompromising, conscientious sense of fairness, responsibility, and punctuality. Shortly after his arrival in Berkeley, these skills became evident to his colleagues who admired Jud’s calm efficiency in organizing his classes and research program. Soon after his arrival, following an insightful and concise presentation Jud made at a departmental faculty meeting, a



◀ *Jud and wife Jeanne (1995).*

*Jud in his role as scoutmaster (circa 1979). ▶*

*Jud and his daughter Liz at Timothy Dwight College (Yale) at Liz's graduation in 1981. Both Jud and Liz were members of TD College during their Yale years. ▼*



senior professor in the department remarked, “This fellow is amazing. He could run General Motors.”

Whether with students, colleagues, secretaries, carpenters, or CEOs of major corporations—in short, with anyone—Jud has a gift for attentive listening. His role as administrator is to be helpful rather than obstructive. His decisions are always well-considered; they are clear, unambiguous, and expressed with gracious diplomatic sensitivity. Everyone may not agree with a particular decision but it is always received with respect and without rancor. Jud’s firmness is always accompanied with a friendly twinkle, often enhanced by light humor. No one ever gets angry with Jud, nor does he ever show anger: He is always calm and considerate, never raising his voice. At heated faculty meetings it would be instructive to put a pH meter in his stomach to determine his real feelings.

Jud and Jeanne King have three (now grown) children: Mary Elizabeth, Cary, and Catherine. Since 1969, Jud and Jeanne have lived high in the Kensington hills, in a house overlooking Tilden Park. They are enthusiastic hikers all over California, especially in the Sierra Nevada Mountains (where they have a summer residence at Mammoth Lakes) and on the coast, between Jenner and Mendocino (where they have a weekend home in The Sea Ranch near Gualala).

For many years, Jud was active in Boy Scouts, serving as scoutmaster of a local Boy Scout troop. He has led dozens of overnight scouting hikes in the mountains, canyons, and parks of California. When asked if he ever had disciplinary problems with his boys, Jud replied, “No, the boys are no trouble. But sometimes I had problems with accompanying dads.”

A perennial problem of such hikes is avoiding poison oak. Following unintended exposure to poison oak, Jud recommends soaking 15 minutes in a full bathtub with one cup of Clorox added to the bath water.

Now, as director of Berkeley’s Center for Studies in Higher Education, Jud is using his extensive university experience first, to identify some major problems facing higher education in California (and elsewhere). And second, to stimulate research toward solving such problems. Topics that reflect his particular concerns include the university’s role in maintaining and promoting innovative technology, methods for sustaining a large research-oriented university in the face of perennial financial shortages, and the role of new technology to advance and facilitate scholarly communication.

Jud’s distinguished career as a chemical engineering educator has blossomed toward concerns with higher education in general. For the last 20 years, Jud’s work has been directed toward answering a key question: Today and tomorrow, what is the proper function of a university in the world, in the U.S., in California? While many academics are working on this question, Jud is particularly well-qualified to do so—not only because of his long experience in university administration, but also because of his chemical engineering background that favors versatility, respect for new ideas, goal-orientation, and a faith that good science can lead to useful results.

In engineering and in public service, Jud enjoys a stellar reputation. Whenever President Bush needs to replace a member of his administration, Jud King would be an excellent candidate. □