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American Chemical Society

ChemCensus

Committee on Economic and Professional Affairs

ChemCensus 2005

Analysis of the American Chemical Society's Comprehensive 2005 Survey of the Salaries and Employment Status of its Domestic Members

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Acknowledgments

Every fifth year since 1985 the American Chemical Society conducts a census of its working members. This report presents results of the 2005 ACS Comprehensive and Employment Status Survey, ChemCensus 2005. An analysis of the survey appeared in the August 1, 2005 edition of *Chemical & Engineering News*. Additional publications based on this survey include Industry Chemists 2005 and Academic Chemists 2005.

The ACS Committee on Economic and Professional Affairs (CEPA) and its Subcommittee on Surveys planned and provided general oversight of the survey, its analysis, and the symposium presented at the Fall 2006 ACS National Meeting in San Francisco. Members of the Subcommittee are Martin Gorbaty, Warren Bush, Charles Cannon, Fran Kravitz, Khamis Siam, and David Straus.

This report was written by Michael Heylin, *Chemical & Engineering News*. Mary W. Jordan, workforce specialist of the ACS Department of Member Research and Technology, conducted the survey and produced the data for the tables.

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Preface

The American Chemical Society is dedicated to providing programs and services to facilitate the career development of chemical professionals, and has a long history of effectively reporting on professional chemical employment. The ACS Committee on Economic and Professional Affairs (CEPA) is charged with fostering ongoing improvements in the economic and professional status of chemical scientists. To carry out this mission, CEPA conducts periodic fact-finding studies on the economic status of the chemical profession and monitors the state of the economic and professional affairs of chemical scientists.

CEPA works with the Department of Career Management and Development to provide programs, services, and publications to assist chemists in making career decisions. In particular, CEPA directs the development of workforce studies about employment and industry trends that affect the chemical profession. The published study reports provide: hard data on the salaries of employment of chemists, an overview of trends in the chemical enterprise, and guidance for chemists regarding areas of emerging technologies and employment opportunities.

The last two decades witnessed economic highs and lows that have impacted the chemistry workforce. These changes make it important for chemists to have essential information about hiring trends and employment figures to effectively navigate this fluid situation. A list of the most recent employment studies available from ACS appears on the inside back cover of this publication.

Summary

This report presents an analysis of the data from a survey of the salaries, employment status, and attitudes of American Chemical Society members in the domestic labor force as of March 1, 2005. The survey questionnaire was sent to all members who were likely to be working in the U.S., hence the title, ChemCensus 2005. These comprehensive surveys have been conducted every fifth year since 1985, and the 2005 census is the fifth in the series. In the interim years, ACS conducts its long established smaller surveys that poll a random sample of about 20% of domestic members. These surveys were started in the early 1970s.

ACS surveys seek to gather data from all domestic Society members who are employed full time or part time, on post docs or fellowships, or unemployed but actively seeking employment. Responses from those who indicate they are either fully retired or otherwise unemployed and not seeking a job are not included in the analysis.

Table 1: Employment Status of ACS Workforce Chemists

Job market for chemists has weakened over past 20 years

	Employed Full Time	*Employed Part Time*	*Post Doc*	*Unemployed Seeking Employment*
All ACS Chemists				
1985	95.0%	1.5%	1.9%	1.6%
1990	95.2	1.5	2.2	1.1
1995	91.1	2.7	3.6	2.5
2000	92.9	3.0	2.1	2.0
2005	90.8	4.1	2.0	3.1
Men Chemists				
1985	95.8	1.0	1.8	1.4
1990	95.9	0.9	2.1	1.1
1995	92.3	1.9	3.4	2.4
2000	93.9	2.1	2.0	2.0
2005	91.6	3.4	1.9	3.1
Women Chemists				
1985	90.4	4.3	2.6	2.7
1990	92.0	3.9	2.8	1.2
1995	86.8	4.7	4.5	3.0
2000	89.8	5.9	2.3	2.0
2005	88.7	6.2	2.2	2.9

Source: ChemCensuses

ChemCensus 2005 reveals a snapshot of a still relatively weak but mixed employment situation for chemists in early 2005. A record high 9.2% of respondents did not have a full-time job. But unemployment was down to 3.1% from a record high of 3.6% one year earlier (ACS Salary Survey 2004). There was an increase in those working part time, up to 4.1% from 3.6% in 2004. Those on post docs increased slightly from 1.9% to 2.0%.

Median salaries of individual chemists with the same employer in both 2005 and 2004 rose by a solid 5.0% from $80,000 to $84,000. The increase for those with a bachelor's as their highest degree was from $61,000 to $64,000, or 4.9%. For master's, the in-

Table 2: Salaries of Labor Force ACS Chemists Who Have Not Changed Jobs

Chemists as individuals posted a solid 5% increase in 2005

Median Salary $ Thousands	*2004*	*2005*	*2004–05 Increase*	*Percent Increase*
All	$80.0	$84.0	$4.0	5.0%
By Degree				
B.S.	61.0	64.0	3.0	4.9
M.S.	71.0	75.0	4.0	5.6
Ph.D.	90.0	93.8	3.8	4.2
By Gender				
Men	85.0	89.0	4.0	4.7
Women	65.0	70.0	5.0	7.7
By Race				
Asian	83.1	87.3	4.2	5.1
Black	68.0	72.0	4.0	5.9
White	80.0	84.0	4.0	5.0
By Ethnicity				
Hispanic	70.7	75.0	5.0	6.1
By Citizenship				
Native Born	79.5	83.0	3.5	4.4
Naturalized	89.7	93.4	3.7	4.1
Permanent Resident	82.0	85.3	3.3	4.0
Other Visa	65.0	70.0	5.0	7.7
By Employer				
Business/Industry	87.5	91.0	3.5	4.0
Academic	62.0	65.0	3.0	4.6
Government/Other	81.2	85.1	3.9	4.8
By Age				
20–29	45.0	49.0	4.0	8.2
30–39	67.0	71.7	4.7	7.0
40–49	86.5	90.9	4.4	5.1
50–59	90.0	93.9	3.9	4.3
60–69	93.0	96.0	3.0	3.2

Note: Median salaries as of March 1, 2004 and March 1, 2005

Source: ACS Salary Survey 2004, ChemCensus 2005

crease was from $71,000 to $75,000, or 5.6%; and for Ph.D.s, from $90,000 to $93,800, or 4.2%.

These data come from response to ChemCensus 2005 questions that asked respondents for their base annual salary from their primary employer as of March 1, 2004, and March 1, 2005. As the data for both years come from the same set of respondents to a single survey, the resulting increases in median salaries from 2004 to 2005 are very well founded.

The median salary is that which is equaled or exceeded by one half of survey respondents. Medians avoid the distortions that relatively few very high salaries can bring to means.

The 2004 to 2005 increase in the median salary for all chemists as a group was, as would be expected, smaller. It was from $82,000 for the 2004 survey to $83,000 for ChemCensus 2005.

For a population as large and as stable year to year as the chemistry profession, comparing the median salaries determined by two separate surveys conducted one year apart is essentially a measure of the rate of inflation. Such an approach does not reflect the pay increases related to the promotion, growth in experience, and changing responsibilities of individual chemists. In addition, the apparent overall annual gain can vary significantly from year to year. This approach necessarily includes the uncertainties of measuring a relatively small

Table 3: Median Base Salaries 2005

Pay of chemists in academia trails that of industrial chemists by a large margin

Median Salary for All Chemists $83.0

Industry	$90.0	B.S.	$63.0	Men	$88.0
Government	84.9	M.S.	75.0	Women	66.0
Academia	64.0	Ph.D.	93.0		
B.S.		M.S.		Ph.D.	
Industry	$65.0	Industry	$80.0	Industry	$103.0
Government	62.4	Government	74.0	Government	98.0
Academia	42.2	Academia	52.0	Academia	67.2

Note: Median annual salaries in thousands of dollars for those with full-time permanent jobs as of March 1, 2005

Source: ChemCensus 2005

number – the salary increase – as the difference between two much larger numbers, median salaries, determined by separate annual surveys using different population samples.

The number of questionnaires sent out for the 2005 census, 86,600, was the same as for the 1985 version. By comparison the 1990, 1995, and 2000 censuses involved the mailing of 88,810, 93,500, and 94,100 questionnaires respectively. These numbers reflect a downturn of domestic ACS members in the workforce, only the third downturn in the 130-year history of ACS. The first was in the early years of the Great Depression and the second during the early 1970s. There was a slight uptick in total Society membership by the end of 2005.

The ACS censuses quantify a range of evolutionary demographic changes for the chemical labor force since 1985. To wit:

- The percentage of working ACS member chemists who are women has risen from 15% in 1985 to 25% in 2005. And, according to both ACS, which also conducts an annual survey of new chemistry graduates, and the National Science Foundation, with slightly more than 50% of new chemistry bachelor's degree graduates today are women.
- The percentage of ChemCensus respondents with the bachelor's as their highest degree has declined from 25% in 1985 to 20% in 2005, while the percentage with a Ph.D. has risen from 56% to 63% during the same period.
- Workforce ACS chemists, as a group, have aged considerably. In 1985 and 1990 their median age was 42. In 2005, it was 47.
- The percentage of chemists who are naturalized, permanent residents, or in other visa categories has risen from 12% in 1985 to 20% in 2005.
- The percentage of chemists who are American Indian, Asian, or Black has risen from a combined total of 9.0% in 1990 to 14.2% in 2005. The largest increase has been for Asians – from 6.3% to 10.9%.

Table 4: Demographics of Working ACS Chemists

As a group, they are getting older, more diverse, and better qualified

	Year of Census				
	1985	*1990*	*1995*	*2000*	*2005*
By Gender					
Women	15.1%	18.1%	21.6%	24.2%	25.2%
By Highest Degree					
B.S.	25.2	24.2	24.2	21.9	19.7
M.S.	17.8	17.2	16.8	17.2	16.8
Ph.D.	56.3	58.2	58.6	59.9	62.5
Other	0.7	0.4	0.3	1.1	0.9
By Age					
20–29	12.4	11.0	9.3	6.8	5.2
30–39	30.3	32.5	31.3	27.5	22.6
40–49	26.8	28.5	28.5	30.0	29.4
50–59	20.4	19.6	23.2	26.2	28.7
60–69	10.0	8.3	7.7	9.6	14.2
By Citizenship					
Native	87.6	87.7	82.3	79.5	79.8
Naturalized	8.0	7.1	8.5	10.2	10.1
Permanent Resident	3.7	3.9	7.1	8.9	6.5
Other Visa	0.6	1.3	2.1	3.4	3.5
By Ethnicity					
Hispanic	–	1.4	2.2	2.5	2.7
By Race					
White	–	91.0	85.8	85.5	85.8
Asian	–	6.3	10.3	11.0	10.9
Black	–	1.3	1.4	1.9	1.9
American Indian	–	0.4	0.2	0.2	0.2
Other	–	1.0	2.3	1.3	1.2

Source: ChemCensuses

- There has been only modest progress for Blacks and Hispanics in chemistry, who are still greatly underrepresented. Both of these groups individually account for about 13% of the U.S. population. But Blacks accounted for only 1.9% of the chemical workforce in 2005, up from 1.3% in 1990. For Hispanics, the gain was from 1.4% in 1990 to 2.7% in 2005.

- Far fewer chemists are working for the traditional chemical industry. Growing percentages are working for drug makers or employed in academia.

Overall, the five ACS censuses trace how ACS members in the domestic labor force have, over the past 20 years, become an older, better qualified, and somewhat more diverse group. However, during this period of substantial growth in the total U.S. labor force, working ACS member chemists have not become a larger group. This fact raises several questions.

- Does it mean that the number of those practicing chemistry and closely related disciplines in this country was no larger in 2005 than it was in 1985?

- Or, does it mean that, although there has been growth, a declining percentage of professional practitioners of chemistry and related sciences are ACS members?

- If the latter is the case, is such a decline related to the increasingly interdisciplinary nature of chemistry as a science in recent years, or are there other explanations?

Table 5: Ph.D. Graduating Classes

Total of new chemistry and chemistry-related Ph.D. graduates has grown 32% since 1985

	Year of Survey				
New Ph.D. Graduates	*1985*	*1990*	*1995*	*2000*	*2003*
Chemistry	1,836	2,100	2,162	1,989	2,037
Chemistry-Related					
Atomic/Molecular Physics	58	87	110	110	81
Atmospheric Science	16	18	27	39	39
Geochemistry	48	56	42	49	53
Biochemistry	581	678	824	776	772
Molecular Biology	277	413	617	707	613
Soil Science	97	118	99	90	74
Chemical Engineering	504	658	708	724	643
Materials Science	188	307	476	404	437
Total Chemistry-Related	1,769	2,335	2,903	2,899	2,712
Grand Total	3,605	4,435	5,065	4,888	4,749
Percent Chemistry	50.9%	47.4%	42.7%	40.7%	42.9%

Source: National Science Foundation

The expansion and diffusion of chemistry is reflected in the relatively faster growth since 1985 in the number of new Ph.D. graduates in chemistry-related disciplines – such as materials science and molecular biology – than in the number of Ph.D. graduates in chemistry itself (*C&EN*, Feb. 14, 2004, page 68). According to data from NSF, there were 11% more new chemistry doctoral graduates in 2003 than in 1985. The gain in the number of new Ph.D. graduates in chemistry-related fields between 1985 and 2003 was 53%.

The censuses do not answer definitively questions about the true relationship between ACS membership levels and the total number of working chemical scientists. But they do suggest that those trained in the traditional disciplines of chemistry remain steadily loyal to the Society. Another possible inference is that a smaller and probably declining percentage of those in the chemistry-related fields – a larger and faster growing group – are finding ACS membership essential.

Mechanics of the Census

ACS sends salary questionnaires to all its full members who reside in the U.S., are under 70 years of age, and are not in the emeritus, retired, or student member categories.

The 86,600 questionnaires mailed for the 2005 census generated 35,365 responses, for a 41% response rate. This was the lowest rate for the five censuses, down from a high of 53% in 1995. Of those who responded in 2005, 33,441, or 95%, were in the domestic labor force.

Of the respondents in 2005, 32,797, or 93%, were chemists. Of these, 1,758 were fully retired or otherwise unemployed and not seeking employment. This left a sample of 31,039 ACS chemists in the domestic labor force. This compares with about 10,200 chemist respondents to the smaller 2004 survey.

ACS defines chemists as those who fall into either of two categories. One group includes those who identify one of 15 chemistry subdisciplines or specialties – such as organic chemistry, materials science, or biochemistry – listed on the questionnaire as being the most closely related to their current or most recent job. The other category is members who have a degree in chemistry and who are working in business administration, computer science, law, or other non-chemistry areas.

Table 6: Response to Censuses

Number of ACS members in the domestic workforce has dropped over the past five years

Target Population of Workforce ACS Chemists	*Year of Census*				
	1985	*1990*	*1995*	*2000*	*2005*
Questionnaires Mailed	86,600	88,810	93,500	94,100	86,600
Total Respondents	42,613	39,320	49,861	47,831	35,365
Not Seeking Employment	360	527	1,346	2,244	1,924
Respondents In Workforce	42,453	38,793	48,515	45,587	33,441
Response Rate	49%	44%	53%	51%	41%
Chemist Respondents	38,170	34,620	45,314	43,947	32,797
Not Seeking Employment	306	396	1,178	2,003	1,758
Chemists In Workforce	37,864	34,224	44,136	41,944	31,039

Note: ACS questionnaires are sent to all full dues-paying ACS members who reside in the U.S., are under 70 years old, and are not in the emeritus, retired, or student member categories

Source: ChemCensuses

Those who identify chemical engineering as the discipline most closely related to their employment are classified as chemical engineers, even if their highest degree is in chemistry. The data on those practicing chemical engineers are analyzed separately (see page 21). All other data in this report are for chemists only.

Most of this report is concerned with interpretation of the results from the five censuses. With the longer period between them – five years – and the larger number of responses they generate, they yield more consistent and credible trend lines than do the data from the smaller annual surveys. This is particularly true for the analysis of important subsets of the chemistry profession, such as women or minorities.

The census questionnaire has been changed little, especially since 1990. This, too, has helped to ensure comparable data from census to census for most of the parameters measured.

ChemCensus 2005 was conducted by Mary W. Jordan, workforce specialist of the ACS Department of Member Research and Technology, under the oversight of the ACS Committee on Economic & Professional Affairs. Questions about the content of this report should be directed to Janel Kasper-Wolfe at 202.872.6120.

Demographics

An appreciation of the changes in the demographics of the chemistry profession between 1985 and 2005 is essential for meaningful interpretation of the shifts in the employment status and salaries of chemists over these years and for the next five years or so.

By Gender & Age

The mean age for all working ACS chemists has risen from a low of 41.3 years in the 1990 ChemCensus to 47.0 years in the 2005 census. Men, with mean ages of 42.6 years in 1990 and 48.4 in 2005, continue to be about six years older than women – whose mean age was 36.3 years in 1990 and 42.9 years in 2005. By degree, Ph.D. chemists, with a mean age of 48.3 years in 2005, remain about five years older than bachelor's degree chemists, 43.2 years; and slightly older than master's degree chemists at 47.1 years.

Almost 43% of chemist respondents to the 1985 census were less than 40 years old and slightly more than 30% were 50 years or older. By the 2005 census, these data were essentially reversed. Those younger than 40 years had dropped to 28% and the number 50 years and older had risen to 43%. The change is even more marked for men only. The percentage under 40 fell from 39% in 1985 to 23% in 2005.

By employer, government chemists are the eldest, with a mean age of 49.3 years in 2005. They are followed by academic at 48.3; those in manufacturing at 46.1; and those working in non-manufacturing enterprises, at 45.6 years. All of these mean ages are between four and seven years higher than they had been in 1990.

Such aging of the workforce is not unique to the chemistry community. It is largely due to the post-World War II baby boomer generation – those born between 1946 and 1964. This large group is now moving into and through the senior ranks of the employed. Its oldest members are today, at 60 years old, approaching retirement. But the "graying effect" of baby boomers on the labor force will continue to be felt for some years. For example, between 2000 and 2004 alone, the median age of the U.S. population rose from 35.3 years to 36.2 years.

Table 7: ACS Chemists by Mean and Median Age

Chemical workforce has aged markedly since 1990

	Mean Age					*Median Age*				
	Year of Survey					*Year of Survey*				
Years of Age	*1985*	*1990*	*1995*	*2000*	*2005*	*1985*	*1990*	*1995*	*2000*	*2005*
All Chemists	43.4	41.3	43.3	44.8	47.0	42	42	42	45	47
By Gender										
Men	44.3	42.6	44.6	46.3	48.4	43	42	44	46	49
Women	38.2	36.3	38.7	40.4	42.9	35	35	37	39	42
By Highest Degree										
B.S.	40.5	37.5	39.3	40.9	43.2	37	35	38	42	44
M.S.	43.1	41.2	43.3	44.6	47.1	41	41	43	45	48
Ph.D.	44.8	42.9	45.0	49.2	48.3	43	43	45	46	48
By Employer										
Manufacturing	42.6	40.0	42.4	43.3	46.1	41	39	41	43	47
Nonmanufacturing	41.3	39.3	41.4	43.8	45.6	39	38	40	43	45
Government	44.5	42.1	45.3	47.4	49.3	43	43	45	48	50
Academic	45.4	44.0	44.4	46.6	48.3	44	45	44	46	48
By Race										
White	43.5	41.6	43.7	45.2	47.3	42	41	43	45	48
Asian	42.6	39.7	41.2	42.6	44.2	41	40	39	41	42
Black	42.9	39.1	41.5	42.8	45.8	41	39	40	42	45
American Indian	40.0	39.9	41.9	43.7	48.6	38	39	43	42	49
By Ethnicity										
Hispanic	40.2	38.5	39.9	41.9	44.0	37	37	38	41	44

Source: ChemCensuses

Table 8: ACS Chemists by Age and Gender

In 2005 census, less than a quarter of working men ACS chemists were under 40 years old

By Age	*Men*	*Women*	*Total*
1985			
20–29	9.6%	28.1%	12.4%
30–39	29.7	33.9	30.3
40–49	27.7	21.6	26.8
50–59	22.1	10.9	20.4
60–69	10.9	5.4	10.0
1990			
20–29	8.1	24.2	11.0
30–39	31.0	39.4	32.5
40–49	29.9	22.3	28.5
50–59	21.7	10.4	19.6
60–69	9.3	3.7	8.3
1995			
20–29	6.8	18.4	9.3
30–39	28.7	40.6	31.3
40–49	29.7	24.1	28.5
50–59	25.8	13.9	23.2
60–69	9.0	3.0	7.7
2000			
20–29	4.6	13.6	6.8
30–39	24.4	36.9	27.5
40–49	30.4	28.5	30.0
50–59	29.3	18.5	26.2
60–69	11.2	4.4	9.6
2005			
20–29	3.3	10.8	5.2
30–39	19.9	30.7	22.6
40–49	29.1	30.4	29.4
50–59	31.2	21.0	28.7
60–69	16.5	7.2	14.2

Source: ChemCensuses

According to the U.S. Bureau of Labor Statistics (BLS), between 2000 and 2005 the total number of 55- to 64-year-olds employed in the U.S. grew by 29%, while the number of employed 24- to 54-year-olds fell by 0.4%. And Bureau of the Census data indicate that between 2005 and 2010 the population of 45- to 64-year-olds will grow by 11% while the number of 25- to 44-year-olds will decline by 0.5%.

In 1985, 22% of working ACS member bachelor's degree chemists were women, as were 21% of master's and 10% of Ph.D.s. By the 2005 ChemCensus, these percentages were up to 33%, 34%, and 20% respectively.

An indicator of ongoing and future changes in the makeup of the chemical profession is the evolving gender profile by experience as measured by the number of years since the earning of the bachelor's degree. In 1985, 41% of young labor force chemists up to four years beyond receipt of their bachelor's were women. By 2005, 55% were. The growth for women in the next category – five to nine years beyond their bachelor's degree – has been even greater, from 25% in 1985 to 43% in 2005. Of those 10 to 14 years beyond their bachelor's, women have increased from 17% to 35%.

Table 9: Age of U.S. Labor Force

In recent years big growth in number of 55- to 64-year-olds working

	1985	*1990*	*1995*	*2000*	*2005*	*Percent Change 2000–05*
Millions Employed						
Men 25–54	40.2	45.9	48.8	52.2	52.6	0.8%
Men 55–64	6.8	6.3	6.2	7.5	9.6	28.0
Men 25–64	47.0	52.2	55.0	59.7	62.2	4.2
Women 25–54	31.6	38.0	41.7	45.9	45.2	- 1.5
Women 55–64	4.8	4.8	5.2	6.4	8.5	32.8
Women 25–64	36.4	42.8	46.9	52.3	53.7	2.7
Total 25–54	71.7	83.9	90.6	98.2	97.8	- 0.4
Total 55–64	11.6	11.1	11.4	14.0	18.1	29.3
Total 25–64	83.3	95.0	102.0	112.2	115.9	3.3

Note: Data as of March each year

Source: U.S. Bureau of Labor Statistics

Table 10: Population Projections

Big growth in the next five years will be in the number of 45- to 64-year-olds

Millions	*2005*	*2010*	*Change*	*Percent Change 2005–10*
Children up to Age 17	73.6	74.4	0.8	1.1%
College Age: 18–24	29.2	30.5	1.3	4.5
Prime Employment Age:	156.0	163.8	7.8	5.0
25–44	83.2	82.8	-0.4	-0.5
45–64	72.8	81.0	8.2	11.3
Retirement Age: 65+	36.7	40.2	3.5	9.5
Total	295.5	308.9	13.4	4.5%

Source: U.S. Bureau of the Census

Table 11: Chemists by Experience and Gender

Today, almost 40% of younger chemists and about 15% of older chemists, are women

Years Since Bachelor's Degree	Percent Who are Women — Year of Census 1985	1990	1995	2000	2005
0–4	41.3%	43.1%	43.2	51.2%	54.9%
5–9	25.3	32.6	37.1	40.8	42.8
10–14	16.7	22.8	28.8	34.1	34.7
15–19	13.2	16.8	22.0	27.3	30.5
20–24	12.1	13.5	17.8	22.8	26.2
25–29	10.6	12.2	14.7	17.9	21.9
30–34	6.8	10.1	13.2	14.8	18.4
35–39	8.3	6.3	10.8	13.2	14.4
40 or More	8.5	9.8	9.2	12.9	12.6
All	15.0	18.4	21.5	24.2	25.1

Source: ChemCensuses

Table 12: Gender of Supervisor

Chemists twice as likely to have woman supervisor today than in 1990

Percent Supervised by a Woman	Year of Survey 1990	1995	2000	2005
All	8.6%	11.4%	14.1%	16.7%
By Gender				
Men	7.0	9.6	12.0	14.3
Women	16.0	18.0	20.6	23.8
By Degree				
B.S.	11.4	14.7	17.0	19.2
M.S.	11.0	13.8	16.8	19.8
Ph.D.	6.8	9.4	12.0	14.9
By Age				
20–29	13.5	16.2	20.2	23.3
30–39	8.8	11.5	14.6	17.5
40–49	8.0	10.5	13.5	16.2
50–59	6.7	11.0	13.1	15.8
60–69	7.7	9.9	12.2	15.5
Employer				
Manufacturing	6.7	9.9	12.8	14.9
Nonmanufacturing	12.2	15.4	17.0	16.5
Government	10.1	13.4	18.2	21.2
College/University	8.3	9.7	12.2	17.6

Source: ChemCensuses

Another, if less direct, sign of gains for women is growth in the percentage of ACS working chemists supervised by women. For all census respondents, it rose from 9% in 1985 to 17% in 2005. For women respondents, the rise was from 16% to 24%. By employer, it is highest for government chemists, at 21% in 2005.

Further gains for women beyond today's 25% share of the chemical labor force (as measured by ACS membership) would seem ensured. Older chemists 30 years or more beyond their bachelor's degree today – only 15% of whom are women – will retire over the next ten years or so. Chemists up to 14 years beyond their bachelor's degree in 2005, 42% of whom are women, will be moving up through the ranks. And newcomers to the chemical profession will be from graduating bachelor's classes that were 50% or more women.

However, despite these and other positive signs, progress for women has been slow and will likely continue to be slow. It took 20 years for women chemists to advance from 15% to 25% of the profession. And their share moved up by only 1% between 2000 and 2005.

It will still take time before women make up even, say, 30% of working chemists 50 years and older. This group accounted for 43% of all working chemists in 2005 and just 17% of the group were women – up from 8% in 1985.

Even in this age of gender equality, working women are still disproportionately impacted by maternity, child rearing, and family responsibilities. Women chemists are still more likely than men chemists to work part time, take breaks in their careers, and leave the profession early.

Table 13: Chemists by Degree & Gender

Two-thirds of men and one-half of women working ACS chemists have a Ph.D.

	Year of Survey				
Percent	*1985*	*1990*	*1995*	*2000*	*2005*
All Workforce Chemists					
B.S.	25.2%	24.2%	24.3%	21.9%	19.7%
M.S.	17.8	17.2	16.8	17.2	16.8
Ph.D.	56.3	58.2	58.6	59.9	62.5
Other	0.7	0.4	0.4	1.1	1.0
Men Workforce Chemists					
B.S.	23.0%	21.5%	21.2%	19.1%	17.5%
M.S.	16.5	15.7	15.3	15.3	14.8
Ph.D.	59.8	62.5	63.5	64.6	66.8
Other	0.7	0.4	0.3	1.0	0.9
Women Workforce Chemists					
B.S.	37.4%	36.5%	35.4%	30.6%	26.1%
M.S.	25.2	24.0	22.7	23.2	22.9
Ph.D.	36.5	39.1	41.9	45.0	49.9%
Other	0.9	0.4	0.5	1.1	1.1

Source: ChemCensuses

Table 14: Chemistry Degrees by Gender

Percent of working Ph.D. chemists who are women has doubled since 1985

	Year of Census				
Percent of Workforce Chemists Who are Women	*1985*	*1990*	*1995*	*2000*	*2005*
B.S.	22.4%	27.5%	31.4%	34.0%	33.4%
M.S.	21.3	25.5	29.0	32.7	34.2
Ph.D.	9.8	12.3	15.3	18.2	20.1

Source: ChemCensuses

By Marital and Parental Status

All ACS censuses have inquired about the marital status of respondents. There has not been much change for men. In 1985, 84% of them were married, as were 85% in 2005. The number married to a chemist or other scientist rose from 18% to 26% over the period.

For women, there was some change. The percent married increased from 58% in 1985 to 71% in 2005. This gain may be partly due to the greater age of the women in the 2005 survey. Those married to a chemist or other scientist also increased – from 34% in 1985 to 38% in 2005.

The percentage of men responding to the censuses who had dependent children has changed little – ranging between 51% in 1990 and 49% in 2005. For women there has been an increase, from 33% in 1990 to 41% in 2005, again, possibly related to their increased age.

By Education

Despite the career challenges still faced by women, they have been the driving force in the overall upgrade in the academic qualifications of ACS working members since 1985. In 1985, 37% of ACS women chemists in the labor force had the bachelor's as their highest degree and 37% had a Ph.D. By 2005, those with just a bachelor's were down to 26% and those with a Ph.D. were up to 50%.

The shift for working members who are men has been less dramatic. Those with a bachelor's as their highest degree declined from 23% in 1985 to 18% in 2005. Those with a Ph.D. increased from 60% to 67%.

Table 15: College Graduates in the U.S. Labor Force

Today, 47% of college graduates in the total domestic labor force are women

Millions	*1995*	*2000*	*2005*
Men Graduates In Labor Force	17.84	20.02	21.51
Women Graduates In Labor Force	13.29	16.48	19.03
Total Graduates In Labor Force	31.14	36.50	40.54
Percent Who Are Women	42.7%	45.2%	46.9%

Note: Data as of March each year

Source: U.S. Bureau of Labor Statistics

Table 16: Labor Force Chemists by Field of Highest Degree

More than of 70% of working chemists have highest degree in general chemistry or classic chemistry

	Year of Survey				
Highest Degree	*1985*	*1990*	*1995*	*2000*	*2005*
Chemistry: General	17.4%	16.1%	15.1%	12.8%	11.8%
Chemistry: Classic	58.9	58.5	57.7	57.3	58.6
Analytical Chemistry	10.7	11.4	11.6	11.1	12.1
Inorganic Chemistry	7.8	8.4	8.4	8.7	9.5
Organic Chemistry	27.5	26.5	26.0	26.4	25.7
Physical Chemistry	12.2	12.2	11.7	11.1	11.3
Theoretical Chemistry	0.7	–	–	–	–
Chemistry: Other	14.8	15.0	15.2	17.9	17.7
Ag/Food Chemistry	1.2	1.1	1.1	1.2	1.0
Biochemistry	8.4	8.2	7.9	8.2	8.0
Chemical Education	–	–	–	1.6	1.7
Environmental Chemistry	1.1	1.5	1.6	2.3	2.2
Polymer Chemistry	2.2	2.3	2.8	3.1	3.1
Other Chemistry	1.9	1.9	1.8	1.5	1.7
Chemistry: Related	1.9	3.1	3.4	4.0	4.0
Biotechnology	–	0.4	0.4	0.5	0.5
Clinical Chemistry	–	0.2	0.2	0.2	0.2
Materials Science	–	0.6	0.8	1.0	1.1
Medical/Clinical Chemistry	1.0	–	–	–	–
Med/Pharma Chemistry	–	–	2.0	2.3	2.2
Pharmaceutical Chemistry	0.9	1.9	–	–	–
Nonchemistry	6.9	7.2	8.6	7.9	7.8
Business Administration	–	1.8	1.8	1.8	1.7
Computer Science	–	–	0.1	0.2	0.1
Law	–	–	0.4	0.4	0.4
Other Nonchemistry	–	5.4	6.3	5.5	5.6

Source: ChemCensuses

These trends reflect the upgrade for the U.S. labor force in general. According to BLS, the number of college graduates in the labor force grew from 31.1 million in 1995 to 40.5 million in 2005 – a gain of 9.4 million. The number of women college graduates increased by 5.7 million, from 13.3 million in 1995 to 19.0 million in 2005, a 43.2% increase. Men graduates grew by a more modest 3.7 million, from 17.8 million to 21.5 million, a 21% gain.

This trend will continue. Today, according to National Center for Education Statistics data, 57% of all bachelor's degrees in all topics are being earned by women.

By Highest Degree and Work Specialty

Since 1985, there has not been much change in the profile of the disciplines in which ACS member chemists earn their highest degree. In both 1985 and 2005, 59% had their highest degree in the classic subdisciplines of analytical, inorganic, organic, physical, and theoretical chemistry. Over the period, there was a drop from 17% to 12% for general chemistry. This decline is likely related to the decreasing percentage of chemists with a bachelor's as their highest degree.

Other traditional chemistry disciplines – agricultural/food chemistry, biochemistry, chemical education, environmental chemistry, polymer chemistry, and "other" chemistry – totaled 15% in 1985 and 18% in 2005.

Table 17: Chemists by Work Specialty

Some slippage for chemists working in classic disciplines, gains in drug and materials areas

	Year of Survey				
Work Specialty	*1985*	*1990*	*1995*	*2000*	*2005*
Chemistry: General	5.9%	5.6%	5.3%	2.6%	3.1%
Chemistry: Classic	46.4	42.5	41.9	36.7	35.2
Analytical Chemistry	19.3	18.6	18.8	17.4	16.5
Inorganic Chemistry	5.1	4.3	4.0	3.3	3.4
Organic Chemistry	14.3	13.3	13.2	11.4	10.4
Physical Chemistry	7.2	6.3	5.9	4.6	4.9
Theoretical Chemistry	0.5	–	–	–	–
Chemistry: Other	31.9	39.3	27.9	31.8	30.5
Ag/Food Chemistry	3.5	3.1	2.9	3.0	2.7
Biochemistry	7.5	6.2	5.9	5.1	4.9
Chemical Education	–	–	–	6.2	7.0
Environmental Chemistry	5.9	8.0	8.5	6.8	6.0
Polymer Chemistry	11.4	9.4	8.4	8.1	7.1
Other Chemistry	3.6	2.6	2.2	2.6	2.8
Chemistry: Related	6.9	12.9	14.7	17.9	19.9
Biotechnology	–	2.1	2.7	3.3	3.8
Clinical Chemistry	–	1.1	1.0	0.8	0.6
Materials Science	–	4.3	3.9	4.5	5.0
Medicinal Clinical Chemistry	3.6	–	–	–	–
Medicinal/Pharma Chemistry	–	5.4	7.1	9.3	10.5
Pharmaceutical Chemistry	3.3	–	–	–	–
Nonchemistry	8.9	9.7	10.2	11.0	11.3
Business Administration	–	3.4	2.6	2.5	2.2
Computer Science	–	–	1.3	1.4	1.2
Law	–	–	0.8	0.8	1.2
Other Nonchemistry	–	6.3	5.5	6.3	6.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Work specialty defined as discipline most closely related to respondents' current or most recent job

Source: ChemCensuses

Table 18: Working ACS Chemists by Ethnicity/Race and Gender

Hispanics and Blacks still significantly underrepresented in chemists' ranks

	Men	*Women*	*Total*
1990			
Hispanic	1.3%	2.0%	1.4%
White	91.4	89.5	91.0
Asian	6.2	6.8	6.3
Black	1.1	2.1	1.3
American Indian	0.3	0.5	0.4
Other	1.0	1.0	1.0
1995			
Hispanic	2.0	3.0	2.2
White	86.5	83.5	85.8
Asian	10.0	11.4	10.3
Black	1.2	2.2	1.4
American Indian	0.2	0.2	0.2
Other	2.2	2.7	2.3
2000			
Hispanic	2.2	3.5	2.5
White	86.3	83.0	85.5
Asian	10.5	12.8	11.0
Black	1.6	2.8	1.9
American Indian	0.2	0.3	0.2
Other	1.4	1.1	1.3
2005			
Hispanic	2.3	3.6	2.7
White	86.3	84.5	85.8
Asian	10.7	11.4	10.9
Black	1.7	2.6	1.9
American Indian	0.2	0.2	0.2
Other	1.2	1.3	1.2

Source: ChemCensus 1990, 1995, 2000, and 2005

Table 19: Marital Status of Chemists

Reflecting their lower age, women chemists are more likely to be single than are men

Percent of Working ACS Chemists	*Year of Survey*				
	1985	*1990*	*1995*	*2000*	*2005*
Men					
Single	16.5%	17.5%	17.7%	15.8%	15.3%
Never Married	11.7	12.6	12.6	10.8	10.3
Previously Married	4.8	4.9	5.1	5.0	5.0
Married	83.5	82.4	82.3	84.2	84.8
To Chemist	7.6	8.4	9.4	10.4	11.0
To Other Scientist	10.0	10.9	12.0	14.3	14.6
To Nonscientist	65.9	63.1	60.9	59.5	59.2
Dependent Children [Yes]	–	51.3	50.3	50.1	48.8
Women					
Single	41.7	38.2	33.6	31.0	29.3
Never Married	30.7	27.5	24.2	21.2	20.4
Previously Married	11.0	10.7	9.4	9.8	8.9
Married	58.3	61.7	66.4	68.9	70.7
To Chemist	18.3	18.5	19.3	19.7	19.5
To Other Scientist	15.6	16.2	18.1	18.9	18.5
To Nonscientist	24.4	27.0	29.0	30.3	32.7
Dependent Children [Yes]	–	32.9	36.7	39.6	41.1

Source: ChemCensuses

In 1985, 91% of ChemCensus respondents had their highest degree in general chemistry, classic chemistry, or other traditional chemistry disciplines. For the 2005 ChemCensus, this was down to 88%. Those with their highest degree in other than chemistry rose over the period from 7% to 8%.

These data mean that the percentage of domestic ACS members with their highest degree in faster-growing fields, such as materials science and drug-and health-related chemistries, has risen only modestly in absolute terms, from 2% in 1985 to 4% in 2005.

Using the same list of disciplines and subdisciplines as for highest degree, the census questionnaire asks respondents to indicate which is most related to respondents' employment. In this case, there has been more movement.

Between 1985 and 2005, the number of those with general chemistry as their work specialty fell from 6% to 3%. Those working in the classic subdisciplines also decreased, from 46% to 35%. Those with other traditional chemistry subdisciplines as their specialty decreased slightly from 32% to 31%. Those working in non-chemistry specialties increased from 9% to 11%. During the same period, the percentage of chemists whose work specialities were in the faster-growing chemistry-related fields rose from 7% to 20%.

Table 20: Service on a Corporate Board of Directors

Older ACS members are more likely to serve on a board

Percent Who Serve on a Board of Directors	*Year of Survey*		
	1995	*2000*	*2005*
All ACS Chemists	4.6%	3.6%	4.0%
By Gender			
Men	5.2	4.1	4.7
Women	2.1	2.1	1.9
By Highest Degree			
B.S.	4.1	3.3	3.4
M.S.	4.7	3.1	3.9
Ph.D.	4.7	3.8	4.3
By Employer			
Manufacturer	3.1	2.8	2.8
Nonmanufacturer	7.8	6.4	8.3
Government	5.4	2.1	1.9
Academic	3.9	2.0	3.4
By Age			
20–29	0.7	0.4	0.5
30–39	2.1	0.8	1.4
40–49	4.5	2.9	3.6
50–59	7.3	4.9	6.4
60–69	11.2	7.7	9.0

Source: ChemCensuses

By Racial and Ethnic Diversity

Apart from the increase in the number of women, the ChemCensuses trace the evolving diversity of the chemical profession by other measures.

Hispanic, American Indian, Asian, and Black women are somewhat better represented in chemistry than are their men compatriots. For instance, 3.6% of women respondents to ChemCensus 2005 were Hispanic. This compares with 2.3% of men respondents. Also Black women, at 2.6%, were better represented than Black men, 1.7%. For Asians the difference was smaller, 11.4% of women and 10.7% of men.

The number of Asians, who make up about 4% of the U.S. population, has grown from 6.3% of all respondents to the 1990 census to 10.9% for the 2005 census. Much of this gain is due to chemists from China and India who earned their Ph.D.s in the U.S.

Involvement on Boards of Directors

The censuses ask respondents if they serve as a member of any corporate board of directors. In 2005, 4.0% reported they did. This compared with 3.6% in 2000 and 4.6% in 1995. This activity seems to be linked to gender and age. In 2005, it involved 4.7% of men and 1.9% of women. And there was a steady increase by age, from 0.5% of 20–29-year-olds to 9.0% of 60–69-year-olds.

Salaries

The earnings of individual chemists depend on the interplay of a host of factors including age, highest degree, work experience, work specialty, work function, type and size of employer, and area of the country. They also depend, if to a declining extent, on gender.

Table 21: Chemists' Current-Dollar Median Full-Time Salary

Chemists as a group have posted an average annual 3.7% gain in current-dollar salaries since 1985

$ Thousands (Current-Dollars)	*1985*	*1990*	*1995*	*2000*	*2005*	*Avg. Ann. Change 85–05*
All ACS Chemists	$40.0	$49.7	$59.7	$70.0	$83.0	3.7%
By Gender						
Men	41.6	51.7	62.0	74.1	88.0	3.8
Women	30.0	39.0	47.0	56.0	68.0	4.2
By Degree						
B.S.	32.5	38.9	45.3	53.1	63.0	3.4
M.S.	36.0	45.0	53.5	62.0	74.0	3.7
Ph.D.	44.5	55.0	66.0	79.0	93.0	3.8
By Employer						
Manufacturing	42.5	52.0	64.0	75.5	91.2	3.9
Nonmanufacturing	38.0	46.0	53.1	65.1	84.0	4.1
Government	40.0	47.0	59.0	70.0	84.9	3.8
College/University	33.0	43.6	50.0	57.7	65.0	3.5
By Age						
20–29	26.5	32.0	34.4	42.0	47.7	3.0
30–39	36.4	45.0	52.0	60.8	70.6	3.4
40–49	44.0	55.0	65.0	74.5	86.6	3.5
50–59	49.0	59.0	70.3	81.0	92.3	3.2
60–69	49.5	61.4	72.0	81.8	95.0	3.3

Source: ChemCensuses

These parameters can shift with the passage of time – such as the aging of chemists as a group in recent years and the growing numbers with a Ph.D. So, interpreting trends in the median salaries of chemists over time is a complex business.

In current-dollar terms, the median full-time salary of all chemists responding to the censuses more than doubled between 1985 and 2005. It rose at an average annual rate of 3.7% from $40,000 to $83,000 over the period.

When converted into constant 2005 dollars using BLS's inflation calculator, the increase in the median salary for all chemists as a group was from $73,400 in 1985 to $83,000 in 2005. This is a 13%, or 0.6% per year, increase.

This indicates that salary gains for chemists as a group have been comfortably ahead of gains in inflation over the past 20 years. But it may be misleading unless one takes into account the fact that chemists in 2005 had a median age of 47, compared with 42 in 1985. This age differential would account for much of the apparent 13% constant-dollar gain between 1985 and 2005. The higher qualifications of chemists as a group today would help to account for much of the rest.

Chemical Engineers

Salaries for chemical engineers remain higher than those for chemists.

Chemical engineers seem a declining segment in ACS membership. In 1985, 8.1% of respondents to the ChemCensus had their highest degree in chemical engineering and 7.8% identified chemical engineering as their work specialty. By ChemCensus 2005 these proportions were down to 5.9% and 3.9% respectively. In both years, one-third of those identifying chemical engineering as their specialty had their highest degree in other disciplines – mostly chemistry.

The small number of respondents to the 2005 census who indicated chemical engineering as their work specialty, about 1,250, limits the amount of analysis possible. But, as in all previous surveys, chemical engineers are better paid than chemists.

The salary advantage for chemical engineers is largest at the lower degree levels. In 2005 the median salary for working chemical engineers with bachelor degrees was $77,000. This compares with $63,000 for bachelor degree chemists. At the master's degree level the difference is between $96,000 and $75,000 and at the Ph.D. level $107,000 for chemical engineers compared with $93,000 for chemists.

These salary advantages are due, in part, to chemical engineers being more likely to have generally higher-paying industrial jobs (76%) and fewer being in academia.

Table 22: Chemists' Constant-Dollar Median Salaries

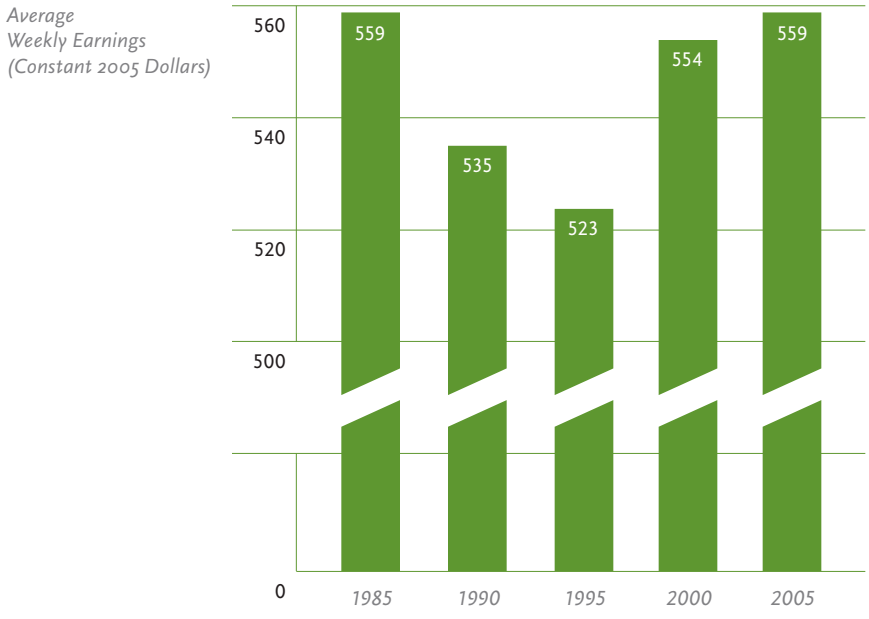
An apparent 13% increase since 1985 related to increasing age of chemists as a group

$ Thousands (Constant 2005 Dollars)	*1985*	*1990*	*1995*	*2000*	*2005*	*Avg. Ann. Change 85–05*
All ACS Chemists	$73.4	$75.2	$77.4	$80.4	$83.0	0.6%
By Gender						
Men	76.4	78.2	80.4	85.1	88.0	0.7
Women	55.1	59.0	61.0	66.3	68.0	0.8
By Degree						
B.S.	59.7	58.8	58.8	61.0	63.0	0.3
M.S.	66.1	68.0	69.4	71.2	74.0	0.6
Ph.D.	81.7	83.2	85.6	90.7	93.0	0.7
By Employer						
Manufacturing	78.0	78.6	83.0	86.7	91.2	0.8
Nonmanufacturing	69.8	69.6	68.9	74.7	84.0	0.9
Government	73.4	71.1	76.5	80.4	84.9	0.7
College/University	60.6	65.9	64.9	66.2	65.0	0.3
By Age						
20–29	48.7	48.4	44.6	48.2	47.7	-0.1
30–39	66.8	68.0	67.4	69.8	70.6	0.3
40–49	80.8	83.2	84.3	85.5	86.6	0.3
50–59	90.0	88.2	91.2	93.0	92.3	0.1
60–69	90.9	92.8	93.4	93.9	95.0	0.2

Source: ChemCensuses, using U.S. Bureau of Labor Statistics for cost of living increases

Graph 1: Private Salaries

In constant-dollar terms, average weekly earnings in private industry are the same as 20 years ago



Note: Data as of March each year

Source: U.S. Bureau of Labor Statistics

This lack of real growth in the constant-dollar salaries of chemists as a group since 1985 is not surprising. It reflects what has happened to salaries in general. According to BLS data, median private weekly earnings, in constant 2005 dollars, and across all industries were $559 in both 1985 and 2005, with a low of $523 in 1995.

Chemists, as individuals, have inevitably fared better. This is because as a group the average age of chemists increased five years between 1985 and 2005. However, the age of an individual chemist increased 20 years over this period.

Between 1995 and 2005 chemists who did not change jobs year-to-year posted annual gains in their median salaries that ranged between 4.2%, for 1995 to 1996, to 5.0%, for 2004 to 2005. The average annual gain in median salaries for the 10-year period was 4.7%, while the average annual increase in the cost of living was 2.6%. Thus, the "real" salary gain was the 2.1 annual gain in excess of inflation.

The increase between 2004 and 2005 held reasonably steady at close to 5% among the subsets of the chemist population. However, women apparently had an edge over men, with a 7.7% versus a 4.7% gain. This would be in line with the long established pattern of higher annual gains for younger chemists. In 2005, gains were 8.2% for 20- to 29-year-olds and steadily decreased to 3.2% for 60- to 69-year-olds.

Table 23: Gains in Salaries of Chemists Who Have Not Changed Jobs (1995–2005)

Individual chemists have posted annual increases about 2% higher than inflation

Year	*Percent Salary Gain*	*Percent Cost of Living Increase*
1994–95	4.6%	2.8%
1995–96	4.2	3.0
1996–97	4.7	2.3
1997–98	4.7	1.6
1998–99	4.8	2.2
1999–00	4.9	3.4
2000–01	4.9	2.9
2001–02	4.8	1.6
2002–03	4.6	2.3
2003–04	4.3	2.7
2004–05	5.0	3.4
Average	4.7	2.6

Sources: ChemCensuses and salary and employment surveys for salary gains and U.S. Bureau of Labor Statistics for cost of living increases

Total Professional Income

The differences between the median base salaries and the median total professional income of chemist respondents to ACS's censuses has increased but remained quite small.

An exact measure of this difference is not possible as the censuses ask for total professional income for the previous calendar year – for instance, for 2004 in ChemCensus 2005. However, the differences between the total income for one year and the basic salary rate as of March 1 the next year yield slightly depressed approximation.

For the 1990 census, this difference was $1,300 or 2.6% – $49,700 median salary as of March 1, 1990 versus $51,000 median professional income in 1989. In 2005, it was a difference of $3,000 – $83,000 versus $86,000 – or 3.6%. The extra income measured this way was a little higher for Ph.D.s in 2005 at 4.7%, and it increased with age, from 2.1% for 20- to 29-year-olds to 6.3% for those 60 to 69.

The bulk of extra income comes from bonuses. In the 2005 census, 49% of respondents reported they had been eligible for a bonus in 2004. Of these, almost 92% received one. This means that 45% of all respondents received a bonus in 2004 and 55% didn't. Of chemists in manufacturing, 74% were eligible for a bonus. This compares with 9% of academics. Men had a slight advantage, with 51% being eligible compared with 44% of women. The median size of the bonuses awarded was $6,000. The range was from $7,800 for those in manufacturing who received bonuses to $1,800 for government chemists.

In 2005, consulting was the primary occupation of 3.4% of ChemCensus respondents. About another 8% did some consulting. The median consulting rate was $100 per hour. Fifty six percent of those consulting did so for less than 10 hours per month. This activity is apparently age-related, with 2.4% of 20- to 29-year-olds involved compared with 21% of 60- to 69-year-olds.

Table 24: Chemists' Total Current-Dollar Professional Income

$ Thousands (Current-Dollars)	*1990*	*1995*	*2000*	*2005*	*Avg. Ann. Change 90–05*
All ACS Chemists	$51.0	$61.0	$71.0	$86.0	3.6%
By Gender					
Men	54.0	65.0	76.0	92.0	3.6
Women	39.6	48.0	56.0	70.0	3.9
By Degree					
B.S.	40.0	47.0	54.0	65.0	3.3
M.S.	46.0	55.0	63.0	75.3	3.3
Ph.D.	57.4	69.2	80.3	97.4	3.6
By Employer					
Manufacturing	54.0	65.4	77.0	96.0	3.9
Nonmanufacturing	47.7	54.1	66.0	85.3	3.9
Government	48.0	60.0	68.5	83.3	3.7
College/University	48.0	55.0	62.0	70.0	2.5
By Age					
20–29	32.0	34.1	41.0	46.7	2.5
30–39	45.0	53.0	60.0	72.0	3.2
40–49	57.1	67.0	76.0	90.1	3.1
50–59	62.0	75.0	85.0	98.0	3.1
60–69	65.0	76.3	86.9	101.0	3.0

Source: ChemCensuses

Table 25: Chemists' Bonuses

In 2004 about 45% of working ACS chemists received a bonus and 15% received stock

	Percent Eligible for Bonus in 2004	*Percent of Eligible Who Received a Bonus*	*Median Bonus Received $ Thousands*	*Percent Who Received Stock in 2004*
All ACS Chemists	48.9%	91.5%	$6,000	15.2%
By Gender				
Men	50.7	91.0	4,000	15.8
Women	43.5	93.1	4,200	13.3
By Degree				
B.S.	57.9	91.9	4,000	12.7
M.S.	54.4	92.4	5,000	13.1
Ph.D.	44.5	91.1	9,000	16.5
By Employer				
Manufacturing	74.0	93.4	7,800	25.2
Nonmanufacturing	55.6	87.8	5,000	17.0
Government	36.3	83.7	1,800	0.8
College/University	8.8	81.9	2,000	1.6

Source: ChemCensus 2005

Another source of additional income for chemists is stock. Fifteen percent of respondents to the 2005 census received stock as part of their annual professional income in 2004. This included 25% of chemists in manufacturing and 2% of academics.

Salaries of Women

By one measure, it appears that only modest progress has been made in the past 20 years in closing the gap between the salaries of men and women chemists. The median salary for all women respondents to ChemCensus 1985 of $30,000 was 72% of the median of $41,600 for all men. By the time ChemCensus 2005 was conducted, the median salary for women had moved up just to 77% of that for men – $68,000 versus $88,000.

Again, however, age and qualifications play a role. On average women chemists are about six years younger than men and, in 2005, only one-half of them, compared with two-thirds of men, had Ph.D.s. Much of the salary differential disappears when these factors are taken into account.

When the median salaries of men and women chemists with the same degree, the same type of employer, and the same number of years beyond their bachelor's degree are compared, it is apparent that salary differences between the sexes have declined substantially over the past 20 years. But they have not disappeared.

In 1985, the median salary for women bachelor-degreed nonacademic chemists was 90% or more of that for men for only the first two experience groups – those who were two-to-four years and five-to-nine years beyond their bachelor's degree. In 2005, for women the salaries of bachelor's chemists were at or above this 90% level for all experience groups up to 30 to 34 years beyond the bachelor's.

Table 26: Consulting in 2004

About 11% of chemists have some income from consulting

	Consulting		
	Consulting Was Primary Occupation	*Do Any Consulting? Yes*	*Consulting Rate $/hour*
All ACS Chemists	3.4%	11.2%	$100
By Gender			
Men	3.6	12.4	100
Women	2.7	7.6	80
By Degree			
B.S.	3.4	4.9	90
M.S.	4.4	7.7	85
Ph.D.	3.1	14.1	100
By Employer			
Manufacturer	1.4	4.1	100
Nonmanufacturer	9.0	12.1	115
Government	0.6	5.0	75
College/University	0.9	22.2	100
By Age			
20–29	1.2	2.4	42
30–39	1.2	6.0	90
40–49	2.8	10.3	100
50–59	4.2	13.4	100
60–69	7.6	20.5	125

Source: ChemCensus 2005

Table 27: Chemists' Median Salary by Experience: 2005

Older chemists earned about twice as much as young ones

$ Thousands (Current-Dollars)	*Years Since Bachelor's Degree*								
	2–4	*5–9*	*10–14*	*15–19*	*20–24*	*25–29*	*30–34*	*35–39*	*40+*
Workforce ACS Chemists	$42.0	$56.2	$70.0	$78.3	$87.2	$92.5	$96.0	$105.0	$96.0
By Gender									
Men	42.5	58.0	72.0	80.5	90.5	95.0	98.0	100.0	99.1
Women	42.0	54.0	66.0	71.0	77.5	80.0	78.0	74.0	80.0
By Degree									
B.S.	42.0	51.7	59.5	67.0	72.0	78.7	77.1	80.0	79.4
M.S.	47.7	57.5	66.0	73.0	77.1	80.0	83.5	81.0	78.8
Ph.D.	–	70.9	78.7	84.0	95.0	100.4	105.0	102.2	100.0
By Employer									
Manufacturing	45.2	60.0	80.0	87.5	96.5	101.0	105.0	107.0	103.7
Nonmanufacturing	39.0	59.5	77.4	84.0	90.0	91.2	93.0	100.0	101.1
Government	37.0	55.5	70.0	76.6	85.4	87.1	85.0	99.0	107.5
College/University	32.5	45.3	50.7	56.0	62.4	69.0	73.9	80.0	89.0
High School	33.5	37.0	42.0	47.3	51.0	51.0	56.0	55.5	62.0
By Percentile									
B.S.									
90%	57.0	70.0	83.0	98.0	105.0	119.0	115.0	126.2	138.0
75%	50.0	60.5	71.2	80.2	89.0	99.4	97.6	103.0	102.0
50%	42.0	51.7	59.5	67.0	72.0	78.7	77.1	80.0	79.4
25%	35.0	43.6	50.0	53.0	59.0	61.0	60.0	60.0	59.7
10%	30.0	37.0	41.6	43.0	46.3	47.9	45.0	47.7	43.0
M.S.									
90%	–	72.0	85.0	100.0	111.0	117.0	125.0	126.0	121.0
75%	–	65.0	77.0	86.0	92.0	97.0	104.0	101.0	100.0
50%	–	57.5	66.0	73.0	77.1	80.0	83.5	81.0	78.8
25%	–	48.0	52.1	60.0	62.0	63.0	65.0	61.0	58.8
10%	–	40.0	40.0	45.0	48.5	48.0	50.0	47.0	44.0
Doctorate									
90%	–	91.8	105.0	120.0	139.8	155.0	160.0	161.0	162.0
75%	–	84.0	93.0	100.0	113.5	125.0	130.0	130.0	130.2
50%	–	70.9	78.7	84.0	95.0	100.4	105.0	102.2	100.0
25%	–	48.0	55.9	61.0	72.5	80.0	80.0	78.0	76.0
10%	–	40.0	45.0	48.0	52.5	56.0	56.5	57.0	59.0

Source: ChemCensus 2005

Table 28: Industrial Chemists' Median Salary by Experience

Women much closer to salary parity with men than they were 20 years ago

Industrial Chemists: 2005 Current-Dollar ($ Thousands)	*Years Since Bachelor's Degree*								
	2–4	*5–9*	*10–14*	*15–19*	*20–24*	*25–29*	*30–34*	*35–39*	*40+*
1985 Census									
B.S.									
Men	$23.6	$29.0	$34.0	$39.0	$42.0	$44.5	$45.0	$45.7	$50.0
Women	23.0	27.0	30.0	34.8	36.0	35.5	36.3	38.2	39.6
Women as % of Men	97%	93%	88%	89%	86%	80%	81%	84%	79%
M.S.									
Men	26.3	30.7	35.0	40.0	45.0	48.0	48.4	50.0	50.0
Women	26.5	29.5	32.1	35.0	38.3	37.8	44.3	42.5	–
Women as % of Men	101%	96%	92%	88%	86%	79%	92%	85%	–
Ph.D.									
Men	–	38.0	42.0	48.6	54.3	57.0	60.0	60.0	61.2
Women	–	37.5	40.0	44.0	46.0	43.0	50.0	54.0	–
Women as % of Men	–	99%	95%	91%	85%	75%	83%	90%	–
2005 Census									
B.S.									
Men	$37.7	$53.7	$62.0	$70.0	$76.9	$83.7	$81.5	$85.8	$84.3
Women	36.0	51.0	59.5	68.0	70.2	78.2	76.0	67.9	75.0
Women as % of Men	95%	95%	96%	97%	91%	93%	93%	79%	89%
M.S.									
Men	–	61.0	70.5	79.1	83.3	88.0	95.0	93.0	95.0
Women	–	58.9	68.9	77.0	77.5	82.0	89.5	85.0	77.1
Women as % of Men	–	97%	98%	97%	93%	93%	94%	91%	81%
Ph.D.									
Men	–	82.0	90.1	96.0	105.0	113.0	117.0	115.0	114.0
Women	–	79.0	88.3	92.0	101.9	105.3	112.5	116.1	103.0
Women as % of Men	–	96%	98%	96%	97%	93%	96%	101%	90%

Source: ChemCensus 1985 & 2005

Table 29: Academic Chemists's 9–10 Month Salaries by Gender 2005

Women still minority in academia, but their salaries close to those of men at the same level

$ Thousands	*Salary Men*	*Salary Women*	*Women's % of Men's*	*Percent Women*
B.S. Degree-Granting				
Full Professor	$71.0	$67.6	95%	18%
Associate Professor	53.0	53.2	100	36
Assistant Professor	45.5	47.0	103	37
M.S. Degree-Granting				
Full Professor	78.7	74.0	94	16
Associate Professor	59.5	56.9	96	31
Assistant Professor	49.8	50.0	100	33
Ph.D. Degree-Granting				
Full Professor	100.0	90.0	90	12
Associate Professor	66.0	70.0	106	21
Assistant Professor	59.9	57.7	96	26

Source: ChemCensus 2005

The change has been even bigger for women Ph.D.s. In 1985 their median salaries were 90% or more that of men up to those 10 to 14 years beyond the bachelor's. In 2005, the salaries of all women Ph.D.s, even including those 40 years or more beyond the bachelor's, met or exceeded the 90% level.

In general, ChemCensus data suggest that women chemists are at or close to receiving equal pay for equal qualifications, experience, and work in the jobs that they have. The data also suggest that the major remaining salary disadvantage for women chemists is that they are still underrepresented in the higher paying echelons of the profession and overrepresented in the lower paying ones.

An example of this near-parity can be seen in the salaries of women professors, associate professors, and assistant professors with 9-10 month contracts at bachelor's-, master's-, and Ph.D.-granting departments. In all cases women's median salaries are 90% or more that of men.

However, although 26% of all academic respondents to ChemCensus 2005 were women, they represented only 12% of the highest paid group – full professors at Ph.D.-granting schools. They were a higher 37% of the lowest paid group – assistant professors at schools with bachelor's as the highest degree.

There is a similar pattern for industrial chemists. Women constitute 20% of those in the highest-paying one-third of work specialties, such as business administration with a median 2005 salary of $111,000, medicinal/pharmaceutical chemistry at $95,000, and polymer chemistry at $92,000. Women were 22% of the middle third. And they represented 32% of those in the four lowest-paying specialties – analytical chemistry at $75,300, environmental chemistry at $75,000, general chemistry at $67,000, and chemical education at $54,900.

Table 30: Academic Chemists' Salaries

Salaries of Ph.D. chemistry professors have more than doubled since 1985

	Type of School					
	B.S. Granting		*M.S. Granting*		*Ph.D. Granting*	
$ Thousands (Current-Dollars)	*9–10 Months*	*11–12 Months*	*9–10 Months*	*11–12 Months*	*9–10 Months*	*11–12 Months*
1985						
Full Professor	$33.0	$39.9	$36.9	$47.5	$ 44.0	$ 53.0
Associate Professor	26.0	27.0	29.1	36.0	32.0	38.0
Assistant Professor	22.0	22.0	24.0	27.0	26.0	30.0
1990						
Full Professor	44.0	53.6	50.0	62.0	58.1	75.0
Associate Professor	34.0	37.5	37.0	–	41.3	52.0
Assistant Professor	29.0	28.2	30.8	–	35.0	42.0
1995						
Full Professor	52.0	65.0	57.6	74.0	70.4	90.2
Associate Professor	40.0	41.0	44.1	58.0	48.2	59.9
Assistant Professor	34.5	34.8	35.9	–	41.0	48.0
2000						
Full Professor	61.4	72.4	68.0	88.8	85.0	106.5
Associate Professor	47.6	49.6	51.0	60.6	56.0	66.2
Assistant Professor	39.9	38.4	42.4	43.5	49.1	57.0
2005						
Full Professor	70.0	78.4	77.0	99.0	100.0	130.0
Associate Professor	53.0	59.0	58.0	–	67.4	80.5
Assistant Professor	46.0	47.0	50.0	–	58.9	71.0

Source: ChemCensuses

Table 31: Salaries by Work Specialty

Women are more prevalent in lower paying specialties

Specialty	*Median 2005 Salary $ Thousands*	*Percent of Total*	*Percent Women*
Business Administration	$111.0	1.5%	15%
Law	106.0	0.8	26
Med/Pharma Chemistry	95.0	11.2	23
Biotechnology	94.1	3.0	24
Computer Science	92.9	1.0	16
Materials Science	92.0	5.0	19
Polymer Chemistry	92.0	7.4	17
Physical Chemistry	87.5	4.9	16
Organic Chemistry	85.0	10.9	16
Ag/Food Chemistry	84.0	2.8	27
Clinical Chemistry	82.0	0.6	26
Biochemistry	80.0	4.9	29
Inorganic Chemistry	80.0	3.5	17
Analytical Chemistry	75.3	17.6	29
Environmental Chemistry	75.0	6.2	26
General Chemistry	67.0	3.1	31
Chemical Education	54.9	7.3	40
Other	–	7.4	29

Source: ChemCensus 2005

The same gender pattern persists for the breakdown by work function. In 2005, women made up an average 18% of the five highest-paying functions – R&D management at $125,000, patents at $117,500, general management at $105,000, computers at $95,500, and applied research at $91,000. But they were an average 29% of those in the five lowest-paid functions – forensics at $81,500, training at $80,000, "other" functions at $80,000, production/quality control at $75,000, and analytical services at $71,000.

Census data alone cannot establish unambiguously the cause-and-effect relationships between the gender of chemists, the work they do, and what they are paid. For instance, are the median salaries of those in chemical education, assistant professors at bachelor's degree-granting departments, and chemists performing analytical services all low because many of them are women? Or are the median salaries of women chemists still trailing those of men overall because women choose, or for other reasons, tend to find themselves in lower-paying activities?

However, the progress that women have made since 1985 in breaking into the higher-paying work specialties and functions, if still slow in some cases, suggests that women chemists, given the chance, are competitive with their men colleagues.

Other Factors

The gap between chemists compensated at the top percentile and lowest percentile is slowly widening. In 1985, the median salary for bachelor's chemists in the lowest tenth percentile was 52% the median for those in the top tenth percentile. By 2005, the ratio had decreased to 48%. For master's degree holders, the decline was from 46% to 44% and for Ph.D.s from 42% to 38%.

All ACS surveys have indicated a connection between salaries of industrial chemists and the size of their employer. ChemCensus 2005 is no exception, with a the median salary of Ph.D.s ranging from $92,000 for those at concerns with fewer than 50 employees to $110,000 to those at companies with 25,000 or more employees.

Table 32: Salaries by Work Function

Women are more highly concentrated in lower paying functions

Work Function	*Median 2005 Salaries $ Thousands*	*Percent of Total*	*Percent Who are Women*
R&D Management	$125.0	12.1%	13.3%
Patents	117.5	1.2	24.0
General Management	105.0	5.3	16.9
Computers	95.5	1.0	14.4
Applied Research	91.0	33.9	19.6
Basic Research	91.0	6.6	25.5
Marketing/Sales	90.1	5.3	16.4
Consulting	90.0	1.6	25.3
Health & Safety	86.6	3.7	31.9
Chemical Information	85.0	1.4	35.3
Forensics	81.5	0.3	27.1
Training	80.0	0.5	27.9
Other Functions	80.0	3.4	32.3
Production/QC	75.0	10.8	25.8
Analytical Services	71.0	14.0	32.3

Note: Salaries as of March 1, 2005

Source: ChemCensus 2005

Table 33: Industrial Chemists' 2005 Salaries by Size of Employer

Larger concerns have a considerable salary edge for chemists

Median 2005 Salary $ Thousands	*B.S.*	*M.S.*	*Ph.D.*
Number of Employees			
Fewer than 50	$58.8	$72.0	$ 92.0
50 to 99	57.7	73.0	96.0
100 to 499	59.0	74.0	98.3
500 to 2,499	62.4	79.0	100.0
2,500 to 9,999	66.5	80.0	102.5
10,000 to 24,999	70.0	82.0	103.0
25,000 or More	72.0	83.1	110.0

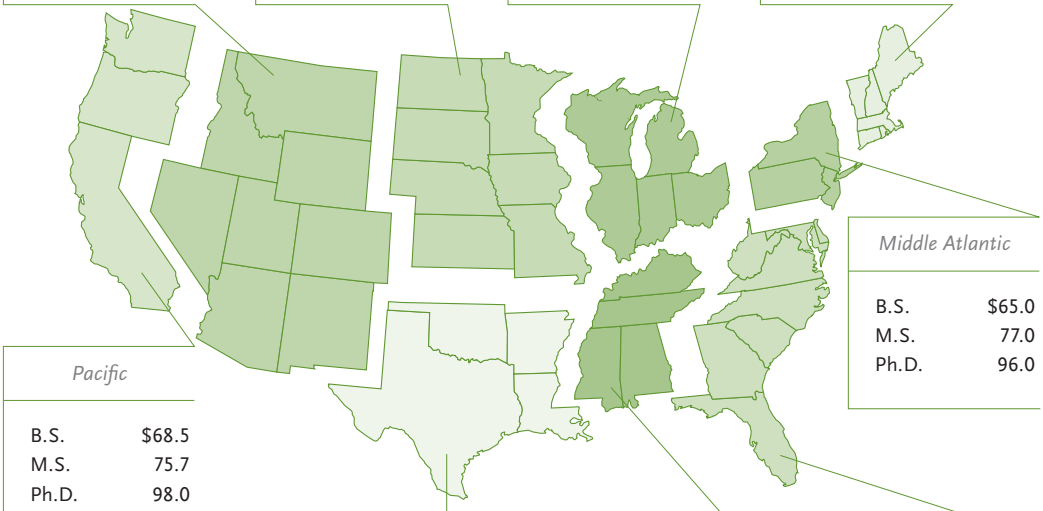
Note: Median salaries as of March 1, 2005

Source: ChemCensus 2005

By geography, chemists on the Pacific and Atlantic coasts are generally better paid. By degree, 2005 median salaries for bachelor's chemists varied from $68,500 in the Pacific region to $55,900 in the West North Central area. For Ph.D.s, the range was from $98,300 in New England and $98,000 in the Pacific region to $76,600 in the East South Central region.

Table 34: Chemists' 2005 Median Salaries, by Region ($ Thousands)

Chemists on east and west coasts tend to be paid more



Mountain	
B.S.	$58.0
M.S.	67.5
Ph.D.	90.0

W. North Central	
B.S.	$55.9
M.S.	68.6
Ph.D.	80.0

E. North Central	
B.S.	$62.0
M.S.	72.5
Ph.D.	91.0

New England	
B.S.	$65.0
M.S.	77.0
Ph.D.	98.3

Middle Atlantic	
B.S.	$65.0
M.S.	77.0
Ph.D.	96.0

Pacific	
B.S.	$68.5
M.S.	75.7
Ph.D.	98.0

W. South Central	
B.S.	$67.0
M.S.	70.0
Ph.D.	88.0

E. South Central	
B.S.	$59.0
M.S.	65.0
Ph.D.	76.6

South Atlantic	
B.S.	$63.0
M.S.	73.4
Ph.D.	92.0

Source: ChemCensuses 2005

Table 35: Attitude of Labor Force ACS Members on Salaries

About three quarters of chemists believe they are paid fairly

Percent Who "Agree" or "Strongly Agree" They are Paid Fairly	*Year of Census*				
	1985	*1990*	*1995*	*2000*	*2005*
All Chemists	70.8%	69.1%	67.3%	76.1%	76.6%
By Gender					
Men	71.6	70.0	68.8	77.4	77.6
Women	66.2	65.5	62.2	71.9	73.8
By Degree					
B.S.	67.3	66.1	64.5	73.6	75.1
M.S.	70.0	67.6	67.3	76.0	77.3
Ph.D.	72.5	70.8	68.6	77.0	76.9
By Employer					
Manufacturing	72.8	70.5	68.2	77.4	78.3
Nonmanufacturing	69.1	68.5	65.0	75.8	78.9
Government	64.8	61.3	65.6	74.9	77.5
College/University	68.9	68.8	66.8	72.2	71.2
By Age					
20–29	68.1	69.1	65.5	72.6	74.5
30–39	69.3	67.9	64.3	74.4	74.7
40–49	71.0	69.0	66.9	75.8	76.1
50–59	73.2	71.4	71.2	78.1	77.6
60–69	73.6	71.2	73.2	79.5	79.5

Source: ChemCensuses

Satisfaction with Salaries

The censuses reveal a recent increase in the level of satisfaction chemists have with their salaries. In 1985, 71% of census respondents indicated they "agreed" or "strongly agreed" they were paid fairly. By 1995, not a good year for chemists, this was down to 67%. By 2000, a belatedly strong year for chemists as the long boom of the 1990s finally came to an end, it was up sharply to 76%. For ChemCensus 2005, it was at 77%.

There are no large demographic differences in this measure of salary satisfaction. But there does seem to be a not unexpected link between the size of the paycheck and the level of satisfaction. For instance, in ChemCensus 2005, 77% of men and a lower 74% of women agreed they were paid fairly. Academics, the lowest paid group, were the least satisfied at 71%. And satisfaction apparently increased with age from 75% among 20- to 29-year-olds to 80% among 60- to 69-year-olds.

Employment Status

For the past 20 years, the employment situation for chemists and all others working for a living in this country has been on somewhat of a roller coaster. The period started with the quite strong economies of the second Reagan administration and the early years of the George Herbert Walker Bush administration. Next came a business downturn, followed by the longest and strongest economic and employment boom in U.S. history, which lasted to the end of the second Clinton term. Then came a short and mild recession in 2001, an unprecedented slow recovery for the job market, and a sub-par rate of job growth that continued into 2005.

According to BLS, the number of people on non-farm payrolls grew by 12.8 million between January 1985 and January 1990. For the next half decade the gain decreased to 7.2 million. It was back up to a 14.6 million increase for 1995 to 2000. Then the gain dwindled to just 1.6 million for the next five years through January 2005. The latest year, through January, 2006, has been better, with a 1.9 million payroll increase. But even this is not especially strong. The total U.S. labor force – those 16 years and older and either with a job or actively looking for one – grew by 2.2 million over the same period.

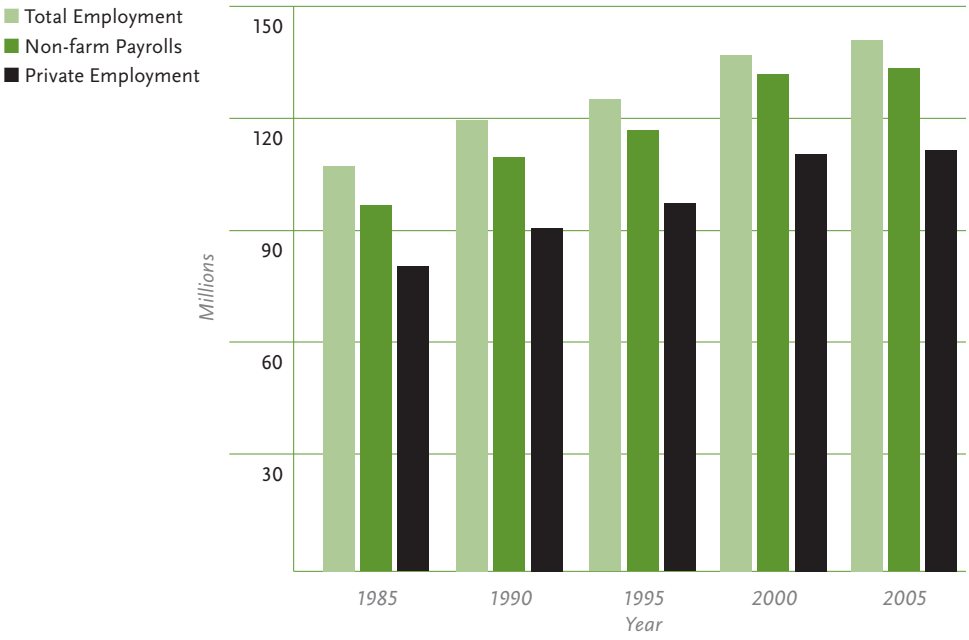
The employment situation for ACS chemists has generally followed this 20-year profile, with a few differences. Chemists were slow to benefit from the big boom that started in 1992. For them, the job market was still weak in 1995. They did not have a really strong employment year until 2000. Since then chemists have suffered their highest unemployment rate ever, which came in 2004. But, again, there has been some improvement lately, with unemployment dropping from 3.5% in 2003 and 3.6% in 2004 to the 3.1% for ChemCensus 2005.

To put the 1990's economic boom and the slow employment recovery from it in perspective, it was the ninth such boom and bust cycle in employment in this country since World War II. For the first eight cycles, the boom phase of employment growth persisted for an average of 66 months. Actual decline in employment then lasted for an average of 12 months followed by 11 more months to get back to the previous peak for a total pause in employment growth of just under two years. The 1990s boom lasted for eight years. The decline in jobs then lasted for 29 months followed by another 21 months to get back into new high ground for a pause in job growth of somewhat more than four years.

Table 36: U.S. Employment

By several measures, job growth has slowed since 2000

						Percent Growth	
Millions	*1985*	*1990*	*1995*	*2000*	*2005*	*00–05*	*85–05*
Total Employment	107.0	119.2	125.0	136.7	140.6	2.9%	31.4%
Non-farm Payrolls	96.8	109.6	116.8	131.4	133.0	1.2	37.4
Private Employment	80.4	91.3	97.4	110.6	111.3	0.6	38.4

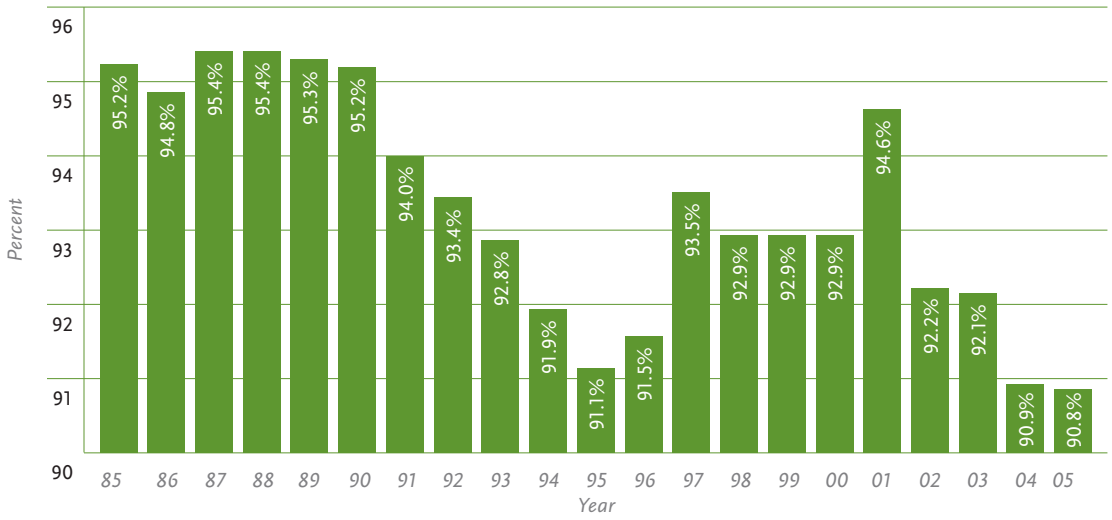


Note: Data as of March each year

Source: U.S. Bureau of Labor Statistics

Graph 2: Full-time Employment of Labor Force ACS Members

Over past five years percentage of chemists with full-time jobs has fallen



Source: ACS ChemCensuses and annual salary and employment surveys

Census Findings

Of the five ChemCensuses, the 1990 version revealed the strongest employment situation with 95.2% of respondents employed full time, 1.5% working part time, 2.2% on post docs, and 1.1% unemployed but seeking employment. This was about as good as it has ever been. By 2005, a lower 90.8% had full-time jobs, 4.1% were working part time, 2.0% were on post docs, and 3.1% were unemployed and seeking employment.

Over the 20-year period, women were consistently less likely than men to have full-time jobs – in 2005, 88.7% compared with 91.6% of men. They were more likely to be working part time – 6.2% compared with 3.4% of men in 2005. Women were also slightly more likely to be post docs in 2005, 2.2% compared with 1.9%, and less likely to be unemployed, 2.9% versus 3.1%.

The time it took unemployed chemists to find jobs was much longer in 2005 than it had been in 1990. In 1990, 42% of those unemployed during the year had a job within three months and 36% were out of work for more than six months. In 2005, only 23% found a job within three months and 59% were jobless for more than six months.

According to the censuses, women do not have a particular preference for part-time work. In 2005, close to 40% of both men and woman employed part time indicated they preferred part-time work. The big difference between genders came in the numbers working part time because of family constraints – 32% of the women, 4% of the men.

Another shift has been in the percentage of full-time jobs that are not permanent. It rose from 4.9% in 1995 to 8.1% in 2005 when 4.9% of jobs were temporary and 3.2% under fixed term contracts.

Table 37: Length of Unemployment

For chemists unemployed in 2005 it was particularly hard to find a job

How Long Unemployed	*Less Than Month*	*1–3 Months*	*4–6 Months*	*7–12 Months*	*More Than 1 Year*	*Total*
Percent of All ACS Chemists Unemployed but Seeking						
1985	13.0%	21.7%	18.1%	17.5%	29.7%	100.0%
1990	14.3	28.1	21.2	18.0	18.3	100.0
1995	9.9	24.3	20.1	19.0	26.7	100.0
2000	8.8	24.7	19.1	18.5	28.9	100.0
2005	7.2	16.8	16.8	18.0	41.2	100.0
Percent of Men ACS Chemists Unemployed but Seeking						
1985	14.1	23.0	16.9	16.4	29.7	100.0
1990	13.2	29.4	21.1	17.2	19.1	100.0
1995	9.4	23.5	19.5	19.1	28.4	100.0
2000	8.8	24.7	20.9	18.4	27.1	100.0
2005	6.7	17.4	16.8	17.3	41.8	100.0
Percent of Women ACS Chemists Unemployed but Seeking						
1985	10.1	18.1	21.5	20.8	29.5	100.0
1990	18.9	23.0	21.6	21.6	41.9	100.0
1995	11.3	26.6	21.9	18.6	21.5	100.0
2000	8.9	24.6	13.3	18.7	34.5	100.0
2005	8.6	14.9	16.7	20.4	39.4	100.0

Note: Data indicate percentage of those who are unemployed but seeking employment

Source: ChemCensuses

Table 38: Reasons for Part-time Work for Chemists

Family constraints are a major reason for part-time work by women

	Year of Census				
	1985	*1990*	*1995*	*2000*	*2005*
Men					
Prefer Part-time Work	38.1%	38.0%	28.0%	43.0%	40.6%
Full-time not Available	31.6	33.3	33.5	23.3	29.3
Family Constraints	3.4	3.4	3.5	3.9	4.1
Other Reasons	26.8	25.2	35.1	29.8	26.0
Women					
Prefer Part-time Work	32.0	32.1	23.6	34.2	40.1
Full-time not Available	23.4	14.7	24.0	15.4	17.4
Family Constraints	31.2	42.4	34.3	36.5	31.8
Other Reasons	13.4	10.7	18.0	13.9	10.6
Total					
Prefer Part-time Work	35.7	35.2	26.0	38.9	40.4
Full-time not Available	27.9	24.1	29.1	19.3	24.5
Family Constraints	15.6	22.6	17.6	20.0	15.2
Other Reasons	20.7	18.0	27.3	21.8	19.9

Note: Percentages are of those working part time

Source: ChemCensuses

Where the Jobs Are

There have been considerable shifts in where ACS chemists work. In 1985, 58% worked in manufacturing. By 2005, this fraction had decreased to 52%. The big shifts have been the change from 25% in 1985 to 15% in 2005 in those working in chemical and related manufacturing and the upsurge in the percentage working in pharmaceutical and related manufacturing, which rose from 12% to 22%. Those working in other manufacturing have dwindled from 21% to 15%. The percentage of chemists in pharmaceutical employment is slated to continue to increase because of the relatively high number of younger chemists already involved. In 2005, 30% of ACS chemists under 40 years old worked in the field. This compares with 18% of those 40 years and older.

These trends for chemists mirror what has happened to manufacturing employment in general in the U.S. In 1985, according to BLS, there were 17.9 million manufacturing jobs. This decreased to 17.3 million by 2000. It then decreased sharply to 14.3 million in 2005. This year, it is down a little further.

BLS data indicate the U.S. chemical industry employed 987,000 workers in this country in 1985. By 2005, this number was down by 11% to 878,000. Of these, 227,000 in 1985 and 290,000 in 2005 worked for pharmaceutical concerns, a 28% increase. Employment in the rest of the chemical industry declined by 23% from 760,000 in 1985 to 588,000 in 2005. Pharmaceutical employment may have reached a maximum; it has not grown in the past year.

Related to these employment trends are responses to two questions in the 2005 census. One asked: "Is your current or most recent employer considered multinational in scope or programs?" The other: "How do you feel offshoring, meaning outsourcing of jobs out of the U.S., has affected your employment in the past five years?"

Sixty-one percent of all respondents reported their employer to be multinational, with a high of 86% of those in manufacturing to lows of 33% of government chemists and 35% of academics. As to the effect of outsourcing on respondents' careers, 72% indicated no impact, 23% a negative effect, and 5% a positive impact. The negative effect was highest, 26%, for those in manufacturing.

Table 39: Status of Jobs

Increasing number of full-time jobs are not permanent

Year	*Permanent*	*Temporary*	*Agency Temporary*	*Fixed-Term Contract*
All ACS Working Chemists				
1995	95.1%	2.6%	0.2%	2.1%
2000	93.0	4.1	0.2	2.7
2005	91.9	4.7	0.2	3.2
Men ACS Working Chemists				
1995	95.8	2.3	0.2	1.8
2000	93.7	3.8	0.2	2.3
2005	92.5	4.3	0.2	3.0
Women ACS Working Chemists				
1995	92.8	4.0	0.2	3.0
2000	90.8	5.2	0.3	3.7
2005	89.9	5.8	0.4	3.9

Note: Percentages are of ACS working chemists with full-time jobs

Source: ChemCensuses

Table 40: Where the Jobs Were for ACS Chemists: 1985–2005

Jobs in chemical industry in downward spiral, gains in pharmaceutical industry and academia

Percent of Workforce ACS Chemists	*Year of Survey*				
	1985	*1990*	*1995*	*2000*	*2005*
Manufacturing	58.0%	52.6%	54.1%	55.3%	51.9%
Chemical & Related	24.7	22.7	20.2	17.9	15.4
Pharmaceutical & Related	12.0	12.3	18.7	21.4	21.6
Other Manufacturing	21.3	17.7	15.1	16.0	14.9
Academia	21.6	22.9	24.8	24.3	27.4
University/4-year College	16.2	18.4	19.3	18.6	20.7
Medical/Professional	2.4	1.7	2.1	2.2	2.0
Two-year College	1.6	1.6	1.8	1.8	2.3
High School	1.4	1.2	1.5	1.7	2.4
Government	9.8	9.0	8.1	7.5	7.6
Nonmanufacturing/ Nonacademic	9.9	12.7	12.0	11.4	11.8
Self-employed	0.7	2.8	1.1	1.5	1.2

Source: ChemCensuses

Table 41: Where the Jobs for ACS Chemists Were in 2005 by Age

30% of younger chemists work in pharmaceutical industry today

Percent of Workforce Chemists with Full-time Jobs in 2005	*Age*		
	Under 40	*40+*	*All*
Manufacturing			
Total	55.4%	50.6%	51.9%
Chemical & Related	12.6	16.5	15.4
Pharmaceutical & Related	30.2	18.3	21.6
Other Manufacturing	12.6	15.8	14.9
Academia			
Total	25.1	28.3	27.4
University/4-year College	19.9	21.0	20.7
Medical/Professional	1.5	2.2	2.0
Two-year College	1.5	2.6	2.3
High School	2.2	2.4	2.4
Government	5.0	8.6	7.6
Nonmanufacturing/ Nonacademic	14.2	10.9	11.8
Self-employed	0.3	1.5	1.2

Source: ChemCensus 2005

Another big swing for chemists has been in the percent in academia and high school teaching, up from 22% in 1985 to 27% in 2005. Those working for government have dropped from 9.8% to 7.6% over the period. And in 2005, only 5.0% of chemists under 40 years old were government employed, compared with 8.6% of chemists 40 years and older.

By Work Function

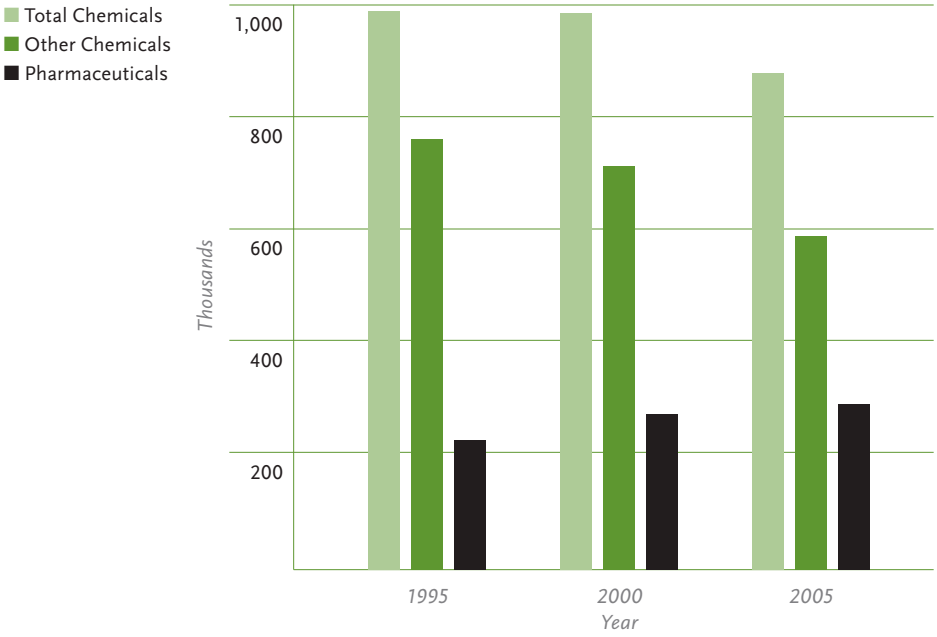
For the five censuses, about one-third of non-academic chemists have indicated they were engaged in applied research, a number that varies from a high of 34% in 1995 to 31% in 2005. Those doing basic research have declined steadily from 14% in 1985 to 7.7% in 2005. Those in R&D management and general management have also dipped, from 24% to 17% in 2005. Marketing/sales and production/quality control combined have declined slowly from 16% to about 15%. There is an apparent large increase in the number of chemists performing analytical functions. However, this gain may be substantially due to changes in the census questionnaire.

In the 1985 and 1990 censuses, the only work function option in the analytical area was "forensics and other lab analysis." For both years, 4.6% of respondents chose it. In 1995, the options were "forensics," 0.8%, and "other lab analysis," 6.0%. For 2000 and 2005, there were also two options. One was "forensics," at 0.9% in 2000 and 1.1% in 2005. The other was "analytical services." Possibly because this is perceived as a more inclusive term, it attracted responses of 14.4% and 14.1%, respectively, in the two years. Unknown is from which other work functions the extra manpower in "analytical services" came. Most likely, the total includes a number of chemists who had previously categorized themselves in one of several other functions.

Table 42: Chemical Industry Employment

Chemical jobs drop by 172,000, or more than 22%, since 1995, while pharmaceutical jobs grow by 63,000

Thousands	*1995*	*2000*	*2005*	*Percent Change 1995–2005*
All Chemicals	987	984	878	-11.0%
Pharmaceuticals	227	272	290	27.8
Pharmaceutical Preparations	184	214	226	24.5
Medicinal & Biological Products	43	59	64	48.8
Other Chemicals	760	712	588	-22.6
Basic Chemicals	228	188	153	-32.9
Resin, Rubber, Fibers	139	136	106	-23.7
Agricultural Chemicals	51	50	40	-21.6
Paints, Coatings	80	79	69	-13.7
Soaps, Cleaning Products	124	131	111	-10.5
Other Chemical Products	138	127	109	-21.0



Note: Data as of March each year

Source: U.S. Bureau of Labor Statistics

Table 43: Multinational Employers and Impact of Offshoring on Chemists

Chemists have a somewhat negative view of the offshoring of jobs

		Effect of Offshoring of Jobs on Career		
	Multinational 2005 Employer	*Positive*	*Negative*	*No Effect*
All Chemists	61.3%	5.3%	23.1%	71.7%
By Gender				
Men	62.4	5.6	23.4	71.1
Women	57.9	4.4	21.8	73.8
By Degree				
B.S.	68.6	4.0	27.5	68.5
M.S.	63.6	4.4	25.6	70.0
Ph.D.	58.3	6.0	20.7	73.3
By Employer				
Manufacturer	86.1	5.4	26.1	68.5
Nonmanufacturer	49.3	6.0	19.5	74.4
Government	33.1	2.5	15.7	81.1
College/University	34.7	4.2	12.4	83.4
By Age				
20–29	66.6	4.0	22.0	73.9
30–39	63.1	5.6	21.5	72.9
40–49	64.7	5.6	25.6	68.8
50–59	60.7	5.0	24.7	70.3
60–70	51.0	5.0	15.8	79.2

Note: Effect percentages are among those with a multinational employer

Source: ChemCensus 2005

Table 44: Non-academic Chemists by Work Function

Close to 40% of non-academic chemists still work on applied or basic research

Percent of ACS Chemists in the Nonacademic Workforce	*Year of Survey*				
	1985	*1990*	*1995*	*2000*	*2005*
Research					
Applied	31.9%	32.6%	34.1%	33.7%	31.2%
Basic	14.4	12.6	11.3	7.9	7.7
Management					
R&D	15.9	14.6	13.9	10.8	11.2
General	8.3	7.4	6.8	5.4	5.5
Analysis					
Forensic & Other Lab Analysis	4.6	4.6	–	–	–
Analytical Services	–	–	–	14.4	14.1
Forensics	–	–	0.8	0.9	1.1
Other Lab Analysis	–	–	6.0	–	–
Other					
Production/QC	9.8	8.7	8.7	7.7	9.6
Marketing/Sales	6.1	5.5	5.3	4.7	4.9
Health/Safety	–	4.5	4.2	3.3	3.2
Consulting	2.4	2.9	2.9	3.3	3.1
Chemical Information	–	1.2	1.2	1.3	1.4
Computers	–	0.9	0.8	1.2	1.0
Patents	–	–	0.6	0.9	1.3
Training/Teaching	–	0.4	0.3	0.5	0.7
Abstracting/Writing	1.5	–	–	–	–
Data Processing	0.6	–	–	–	–
Other	4.4	3.4	4.0	4.2	4.2

Source: ChemCensuses

Table 45: Adverse Professional Treatment

Many women and minority chemists report discrimination during their careers

	Yes				
Discriminated Against	*All ACS Chemists*	*Men*	*Women*		
Gender	13.0%	3.9%	40.3%	White	2.9%
Age	9.5	8.6	12.3	Black	50.1
Race	6.4	6.6	5.5	Asian	24.1
National Origin	4.7	5.0	4.1	American Indian	18.0
Marital Status	3.7	2.3	7.9		
Religion	2.0	2.2	1.6		
Political Affiliation	1.3	1.4	0.9	Asian	21.6%
Disability	1.0	0.9	1.3		
Sexual Orientation	0.7	0.6	0.7		

Source: ChemCensus 2005

Treatment and Attitudes

ChemCensus 2005 respondents report that gender remains the primary reason for adverse professional treatment. Thirteen percent experienced incidents of discrimination based on their sex – 4% of men, and 40% of women. Race discrimination was identified by 6.4% of respondents. This ranged from 50% of Black chemists, 24% of Asians, 18% of American Indians, and 3% of Whites. And 5% of all respondents reported discrimination based on their national origin, including 22% of Asians.

The chemical work place is apparently either more tolerant of, or maybe less aware of, sexual orientation, with only 0.7% reporting discrimination on this basis. Also low were reports of discrimination based on disability, at 1.0%; political affiliation, 1.3%; and religion at 2.0%. Discrimination based on marital status was at 3.7%.

The attitude of chemists on their chances for managerial advancement fell between 1985 and 1995. Since then, it has improved markedly. In 1985, 59% of all census respondents "agreed" or "strongly agreed" there chances were good. By 1995, this was down to 55%. By 2005, it had moved up to 68%.

The improvement has been reasonably uniform throughout the profession. For instance, in 2005 it varied little by either age (69% for men and 66% for women) or highest degree attained (66% for bachelor's and 69% for Ph.D.s).

Table 46: Attitude on Chances for Managerial Advancement

Increasing numbers of chemists believe their chances for managerial advancement are good

Percent Who "Agree" or "Strongly" Agree Their Chances are Good	*Year of Survey*				
	1985	*1990*	*1995*	*2000*	*2005*
All Chemists	58.8%	58.9%	55.3%	67.8%	67.9%
By Gender					
Men	60.4	60.2	56.4	68.3	68.7
Women	49.6	53.0	50.9	64.6	65.7
By Degree					
B.S.	58.4	59.0	55.8	65.8	66.4
M.S.	56.7	56.7	52.7	64.0	64.4
Ph.D.	59.6	59.4	55.8	69.0	69.4
By Employer					
Manufacturing	60.0	58.8	53.3	64.7	64.7
Nonmanufacturing	61.4	61.7	59.2	69.6	70.4
Government	53.2	56.2	51.6	63.4	64.7
College/University	58.2	59.3	60.2	72.4	72.3
By Age					
20–29	60.2	61.0	56.4	71.8	71.9
30–39	58.9	59.7	53.3	69.3	70.0
40–49	60.8	59.7	54.4	66.2	67.4
50–59	56.4	57.9	55.8	65.4	65.2
60–69	56.4	53.9	56.1	68.7	69.4

Source: ChemCensuses

Table 47: Attitude on Chances for Professional Advancement

Men and women chemists are today about equally positive about their chances for professional gains

Percent Who "Agree" or "Strongly" Agree Their Chances are Good	*Year of Survey*				
	1985	*1990*	*1995*	*2000*	*2005*
All Chemists	67.6%	67.4%	64.8%	74.1%	74.2%
By Gender					
Men	68.8	68.4	66.1	74.7	75.0
Women	59.7	62.8	60.2	71.9	72.0
By Degree					
B.S.	62.9	63.8	61.6	71.1	71.4
M.S.	63.1	63.6	61.0	71.5	71.5
Ph.D.	70.9	70.0	67.3	75.9	75.9
By Employer					
Manufacturing	67.6	66.7	63.5	72.2	71.4
Nonmanufacturing	66.7	66.3	63.2	73.5	76.1
Government	59.4	62.0	58.2	67.5	69.6
College/University	72.3	73.4	72.2	78.8	78.7
By Age					
20–29	67.0	70.7	66.7	78.6	77.5
39–39	67.6	67.6	64.9	76.3	76.6
40–49	68.4	67.5	63.2	72.2	73.8
50–59	66.3	67.1	65.5	72.1	71.1
60–69	66.8	64.5	67.4	75.4	76.3

Source: ChemCensuses

The profile of chemists' attitude on their chances for professional advancement is similar. Those believing their chances to be good fell from about 68% of all census respondents in 1985 to 65% in 1995. By 2005, it was at 74%. Again the advance since 1995 is across the board.

Career Hiatus

Another aspect of employment tracked by ACS' surveys is career breaks. Such breaks, or job hiatuses, are defined as career interruptions of six months or more during which a chemist is neither working nor attending school full time.

Women are more likely to have a hiatus than are men. Twenty-six percent of women respondents to the 2005 census indicated they had had at least one. This compares with 17% of men. For men, the hiatuses were mainly triggered by being terminated – 64% involuntary and 15% voluntary for a total of 79%. For women, terminations triggered a lower 34% of hiatuses. The biggest factor for women was maternity and child care at 43%. This compares with 1% for men. Forty-six percent of men and 44% of women who had a hiatus indicated it hurt their career. On the other hand, 23% of men and 12% of women thought it helped.

Table 48: Career Hiatus for ACS Workforce Chemists

One-quarter of women chemists have had at least one six-month break in their careers

	Year of Census			
	2000		2005	
Percent	Men	Women	Men	Women
Had at Least One Hiatus	13.9%	23.8%	16.5%	25.5%
Reason for Hiatus				
Involuntary termination	57.1	17.4	63.9	23.1
Voluntary termination	16.2	11.6	15.0	11.1
Childcare/maternity	0.8	45.8	0.8	42.5
Spousal care	0.2	0.5	0.3	0.5
Elder care	0.7	1.5	0.6	0.9
Personal health	7.4	6.7	3.1	4.3
Other	17.7	16.5	16.4	17.7
Impact of Hiatus on Career				
No effect	32.9	45.4	30.7	44.2
Helped	24.3	12.9	23.4	12.4
Hurt	42.8	41.8	45.9	33.5

Note: A hiatus is a period of six months or more when neither working nor attending school full time

Source: ChemCensus 2000 & 2005

Appendix: Survey Questionnaire

ACS Workforce Publications

Salaries: The ACS annually surveys the ACS membership, gathering detailed employment and salary information on member chemists and chemical engineers living in the U.S. The reports describe the respondents' employment status, employer, work function, specialty, salary and demographic characteristics. Reports are available each year from 1973 through the current year.

Starting Salaries: The ACS also surveys new graduates in chemistry and chemical engineering each year and publishes reports detailing the graduates' employment status, post-graduate plans, starting salaries, and other employment and demographic characteristics. Reports are available for each year from 1975.

ChemCensus 2005: An analysis of the 2005 ChemCensus, looking at over twenty-five years of the chemistry workforce.

Industrial Chemists 2005: An analysis of the 2005 ChemCensus, focusing on twenty-five years of the industrial chemistry workforce (forthcoming, fall of 2006).

Academic Chemists 2005: An analysis of the 2005 ChemCensus, focusing on twenty-five years of the academic chemistry workforce (forthcoming, fall of 2006).

Lifetimes in Chemistry 1999–2000: A Report drawn from the 1999 study of ACS members, aged 50 through 69.

Early Careers of Chemists 2001: A detailed look at the education and early careers of ACS members under age 40 drawn from survey conducted in 2001.

For prices and ordering information, please call or write:

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