



EMPLOYMENT & SALARY SURVEY

Economic recovery under way since late 2001 has not halted erosion of job market for chemists, although most of those with jobs post solid raises

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ACCORDING TO THE LATEST ANNUAL AMERICAN Chemical Society survey of the salaries and employment status of its members in the domestic workforce, 3.6% of them were unemployed but seeking employment as of March 1 this year. This was a record high in the 30-plus-year history of the surveys, if only by 0.1% over the previous high in 2003. The percentage with full-time jobs reached an all-time low of 90.9%. Of the remainder, 3.6% were employed part time and 1.9% were on postdocs or fellowships.

The median base salary of all members with full-time jobs who responded to this year's survey questionnaire was \$82,000. This was 2.5% higher than the \$80,000 median for all those who responded to last year's survey.

For bachelor's chemists, the increase was from \$59,700 to \$62,000; for master's, from \$71,300 to \$72,300; and for Ph.D.s, from \$90,000 to \$91,600. For the first time, the median salary for a major category of chemists reached six figures: Ph.D. industrial chemists are at precisely \$100,000.

The 2.5% increase in the median salary for all chemists as a group in 2004 was higher than the 1.7% rate of inflation. But it was

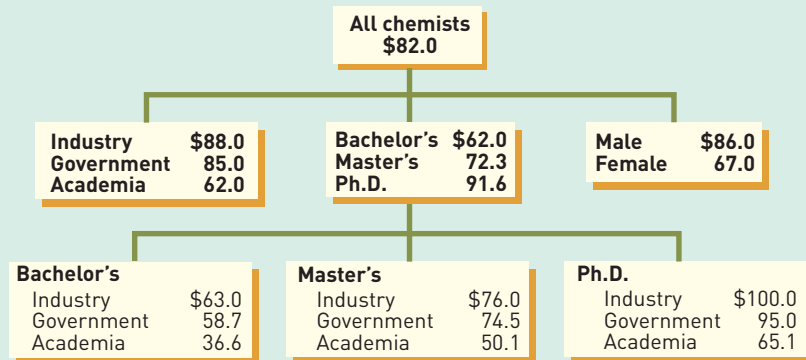
considerably below the 3.5% average annual gain for the past decade. For chemists who did not change jobs between March 1, 2003, and March 1, 2004, the average 2003–04 salary increase was 4.3%.

The increase in the unemployment rate for chemists this year may have been statistically insignificant, but the growth in those with other than full-time employment from 7.9% last year to 9.1% was real. As recently as 2001, only 5.4% of chemists in the workforce were without a full-time job. At that time, 2.5% were employed part time, 1.4% were on postdocs, and 1.5% were unemployed but seeking employment. For all intents and purposes, these levels had represented essentially full employment.

The continued weakness in the employment situation for chemists reflects

MEDIAN BASE SALARIES

Ph.D. industrial chemists reach the \$100,000 milestone



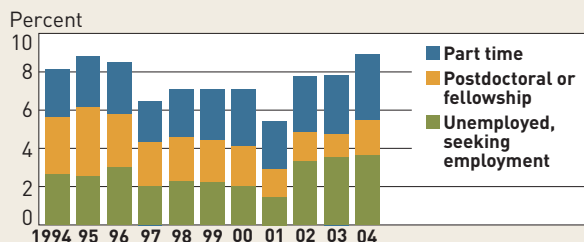
NOTE: Median annual base salary in thousands of dollars for those employed full time as of March 1, 2004.
SOURCE: ACS salary survey 2004

EMPLOYMENT STATUS

Percent of chemists in workforce without a full-time job is at record high of 9.1%, up from 5.4% three years ago

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Employed full time	91.9%	91.1%	91.5%	93.5%	92.9%	92.9%	92.9%	94.6%	92.2%	92.1%	90.9%
Employed part time	2.5	2.7	2.7	2.1	2.5	2.7	3.0	2.5	3.0	3.0	3.6
Postdoc/fellowship	2.9	3.6	2.8	2.3	2.3	2.1	2.1	1.4	1.5	1.4	1.9
Unemployed, seeking employment	2.7	2.6	3.0	2.0	2.3	2.3	2.0	1.5	3.3	3.5	3.6

NOTE: As of March 1 each year. Based on population that excludes those fully retired or otherwise unemployed and not seeking employment.
SOURCE: ACS salary survey 2004



to some extent what is happening in the job market in general. It does not augur well for the chemical profession.

The economy, in gross domestic product terms, has been in recovery since the fourth quarter of 2001. By July 2004, the employment situation nationally was showing some improvement. Unemployment was still well above its low of 3.9% in late 2000, but, at 5.5%, it was down from its recent high of 6.1% in May of last year.

Nonfarm payrolls have been on the rise

since last September. Despite these gains, payrolls this July were still 1.2 million below the peak of 132.5 million set 40 months earlier in March 2001. This was the longest hiatus in job growth since the Great Depression. It is still going on. And it will not be over—nor will payrolls break into new high ground—until late this year, at the earliest.

So far for chemists, as represented by those responding to the ACS survey, there are no signs of even such a partial job recovery. For instance, total employment in

the chemical industry—still a major employer of chemists—is continuing to decline. Excluding pharmaceutical manufacturers, it was down from 701,000 at the end of 2000 to 595,000 this July. The payrolls of many other manufacturing industries that employ substantial numbers of chemists are also continuing to stagnate or drift down.

These conditions are disturbingly similar to what happened to chemists during the record economic boom from 1993

UNEMPLOYMENT

Lower jobless rate that chemists have enjoyed continues to erode

UNEMPLOYED %	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Civilian labor force	6.5%	5.4%	5.5%	5.2%	4.7%	4.2%	4.0%	4.2%	5.7%	5.8%	5.6%
College graduates	2.8	2.5	2.2	2.0	1.8	1.8	1.7	2.0	2.8	3.1	2.9
Chemists	2.7	2.6	3.0	2.0	2.3	2.3	2.0	1.5	3.3	3.5	3.6

NOTE: Data for civilian labor force and for college graduates are from the Bureau of Labor Statistics and for March of each year. Data for chemists are as of March 1 of each year and are from the ACS salary surveys.

through 2000. The job situation for chemists remained weak through 1996, which was a particularly bad year for them. It did not fully recover until 2001, just as the economic expansion ran out of steam.

THE SURVEY. This year's survey is based on the mailing of 30,000 questionnaires to a random sample of the about 90,000 ACS members who reside in the U.S.; are under 70 years of age; and are not in the retired, emeritus, or student member categories.

There were 11,600 responses, for a 39% response rate. About 10,700 of the responses were from chemists, another 427 were from chemical engineers, and 400 were from those with nonchemical degrees. Of the chemists, about 500 were either fully retired or otherwise unemployed and not seeking employment. This left a sample of about 10,200 chemists in the domestic workforce.

ACS defines the chemical workforce as the total of those with full-time or part-time jobs, on postdocs or fellowships, or unemployed but seeking employment. It

AGE OF CHEMISTS

Industry, minority, and women chemists tend to be younger

	MEDIAN AGE	MEAN AGE
ALL CHEMISTS	46	45.9
BY DEGREE		
Bachelor's	42	41.8
Master's	47	46.2
Ph.D.	47	47.2
BY GENDER		
Male	48	47.2
Female	42	42.1
BY ETHNICITY		
Hispanic	41	42.3
BY RACE		
American Indian	41	42.7
Asian	42	44.0
Black	45	44.5
White	47	46.2
Other	45	44.4
BY CITIZENSHIP		
Native born	47	46.2
Naturalized	49	49.1
Permanent resident	40	41.3
Other visa	35	36.5
BY EMPLOYER		
Industry/business	45	44.6
Academia	49	48.2
Government	50	49.1

NOTE: As of March 1, 2004. **SOURCE:** ACS salary survey 2004

DEMOGRAPHICS OF WORKING CHEMISTS

More than a quarter of workforce chemists are now women

	BACHELOR'S	MASTER'S	PH.D.	TOTAL
ALL CHEMISTS	21.2%	16.8%	62.0%	100.0%
BY GENDER				
Male	64.9	65.3	79.6	74.1
Female	35.1	34.7	20.4	25.9
BY ETHNICITY				
Hispanic	3.0	2.3	2.5	2.6
BY RACE				
American Indian	0.3	0.2	0.1	0.2
Asian	3.9	11.0	14.8	11.9
Black	3.2	2.7	1.6	2.1
White	90.2	83.3	81.6	83.7
Other	2.4	2.7	1.8	2.1
BY CITIZENSHIP				
Native born	93.4	82.2	72.3	78.5
Naturalized	5.0	11.5	12.9	11.0
Permanent resident	1.2	3.8	8.5	6.2
Other visa	0.4	2.5	6.2	4.4
BY EMPLOYER				
Business/industry	87.1	75.8	57.2	66.6
Academia	5.0	15.8	34.2	24.9
Government/other	6.7	7.2	7.2	7.1
Self-employed	1.2	1.2	1.5	1.4

NOTE: As of March 1, 2004. **SOURCE:** ACS salary survey 2004

WOMEN IN CHEMISTRY

Women are most prominent in chemical education

	PERCENT OF TOTAL		PERCENT WHO ARE WOMEN	
	WORK SPECIALTY	HIGHEST DEGREE	WORK SPECIALTY	HIGHEST DEGREE
Agricultural/food chemistry	2.9%	1.1%	28.8%	34.8%
Analytical chemistry	17.8	12.5	31.0	29.4
Biochemistry	4.6	7.4	33.0	34.8
Biotechnology	3.7	0.4	26.5	30.4
Chemical education	6.5	1.4	41.7	42.9
Clinical chemistry	0.7	0.2	22.9	39.1
Environmental chemistry	6.1	2.1	27.0	25.5
General chemistry	3.3	13.0	34.5	36.9
Inorganic chemistry	3.2	9.0	15.3	22.7
Materials science	5.0	1.2	18.8	20.0
Medicinal/ pharmaceutical chemistry	11.2	2.4	25.4	28.2
Organic chemistry	11.4	26.2	17.4	17.9
Physical chemistry	5.0	10.9	18.5	19.8
Polymer chemistry	8.2	3.4	17.9	21.8
Other chemical sciences	2.7	4.4	26.4	33.6
Business administration	1.5	0.9	18.7	27.8
Computer science	0.9	0.1	10.8	16.7
Law	0.8	0.1	24.4	16.7
Other nonchemistry	4.3	3.3	33.6	36.3

HOW TO READ THIS TABLE: Example: 17.8% of workforce chemists have analytical chemistry as their work specialty, and 12.5% have their highest degree in analytical chemistry; 31.0% of chemists with analytical chemistry as their work specialty are women, as are 29.4% of chemists with analytical chemistry as their highest degree. **NOTE:** As of March 1, 2004. **SOURCE:** ACS salary survey 2004

WHERE THE JOBS ARE

Chemists of all ages work mostly in manufacturing

% OF CHEMISTS AT ALL DEGREE LEVELS WITH FULL-TIME JOBS	AGE		
	UNDER 40	40+	ALL
MANUFACTURING	60.0%	53.9%	55.8%
Chemical & related	14.7	17.8	16.9
Pharmaceutical & related	32.6	19.1	23.2
Other manufacturing	12.7	17.0	15.7
ACADEMIA	21.4	24.9	23.9
University/four-year college	17.1	18.8	18.3
Medical/professional school	1.6	2.1	1.9
Two-year college	0.9	2.0	1.7
High school	1.8	2.1	2.0
NONMANUFACTURING/NONACADEMIA	18.7	21.2	20.4
Analytical/research services	11.9	8.0	9.2
Government	4.5	8.6	7.4
Self-employed	0.2	1.3	0.9
Other	2.0	3.3	2.9

NOTE: As of March 1, 2004. SOURCE: ACS salary survey 2004

ACADEMIC CHEMISTS BY GENDER

Slow progress seen for women at Ph.D.-granting schools

	MALE	FEMALE	% FEMALE
BY RANK			
Full professor	642	108	14%
Associate professor	245	103	30
Assistant professor	240	101	30
BY INSTITUTION			
Associate granting	70	26	27
Bachelor's granting	357	162	31
Master's granting	137	47	26
Ph.D. granting	650	144	18
Medical school	117	39	25

NOTE: As of March 1, 2004. SOURCE: ACS salary survey 2004

SALARY TRENDS

Chemists as a group post a smaller than usual gain

\$ THOUSANDS	BACHELOR'S	MASTER'S	PH.D.	ALL CHEMISTS
1994	\$44.3	\$52.0	\$65.0	\$57.9
1995	45.4	53.5	66.0	59.7
1996	45.0	53.6	68.0	60.0
1997	49.4	56.2	71.0	63.0
1998	49.6	57.7	73.3	65.0
1999	50.1	61.0	76.0	68.0
2000	53.1	62.0	79.0	70.0
2001	55.0	65.0	82.2	73.0
2002	58.0	68.5	85.2	76.5
2003	59.7	71.3	90.0	80.0
2004	62.0	72.3	91.6	82.0

AVERAGE ANNUAL SALARY INCREASES

	BACHELOR'S	MASTER'S	PH.D.	ALL CHEMISTS
2003-2004	3.9%	1.4%	1.8%	2.5%
1999-2004	4.3	3.5	3.8	3.8
1993-2004	3.5	3.3	3.5	3.5

CONSUMER PRICE INDEX, AVERAGE ANNUAL GAIN

2003-2004	1.7%
1999-2004	2.6
1994-2004	2.4

NOTE: Median base salary of chemists employed full-time as of March 1, 2004. SOURCES: ACS salary survey 2004 for salaries and Bureau of Labor Statistics for consumer price index

EMPLOYMENT FACTORS

Persistent job weakness focused sharply on industry

	EMPLOYED			UNEMPLOYED, SEEKING EMPLOYMENT
	FULL TIME	PART TIME	POSTDOCS	
ALL CHEMISTS	90.9%	3.6%	1.9%	3.6%
BY DEGREE				
Bachelor's	92.2	3.3	0.1	4.3
Master's	90.8	4.7	0.1	4.5
Ph.D.	90.5	3.3	3.0	3.1
BY GENDER				
Male	91.4	2.9	1.9	3.8
Female	89.6	5.3	1.9	3.1
BY ETHNICITY				
Hispanic	90.7	1.9	2.3	5.0
BY RACE				
Asian	87.2	1.1	8.4	3.3
Black	93.4	1.9	0.0	4.7
White	91.4	4.0	1.0	3.6

	FULL TIME	PART TIME	POSTDOCS	UNEMPLOYED, SEEKING EMPLOYMENT
BY CITIZENSHIP				
Native born	91.6	4.0	0.6	3.8
Naturalized	93.1	2.4	0.7	3.8
Permanent resident	92.8	1.8	2.4	3.0
Other visa	71.8	0.5	27.5	0.2

	FULL TIME	PART TIME	POSTDOCS	UNEMPLOYED, SEEKING EMPLOYMENT
BY CURRENT^a EMPLOYER				
Industry/manufacturing	93.9	1.7	0.1	4.4
Industry/nonmanufacturing	87.9	5.6	1.1	5.3
Government	94.7	2.4	1.6	1.3
High school	91.6	6.3	0.0	2.1
College/university	87.1	4.8	6.4	1.6

	FULL TIME	PART TIME	POSTDOCS	UNEMPLOYED, SEEKING EMPLOYMENT
BY CURRENT^a JOB FUNCTION				
R&D	90.3	1.8	4.4	3.6
R&D management	93.7	2.2	0.0	4.2
General management	94.1	2.6	0.0	3.3
Teaching	91.2	7.3	0.2	1.3
Marketing	89.0	2.9	0.0	8.1
Production	93.8	1.2	0.0	5.0

	FULL TIME	PART TIME	POSTDOCS	UNEMPLOYED, SEEKING EMPLOYMENT
BY AGE				
Under 25	91.0	2.5	1.6	4.9
25-29	89.3	1.3	7.5	1.9
30-34	89.4	2.2	6.7	1.7
35-39	90.8	2.7	3.8	2.7
40-44	92.7	2.7	1.4	3.2
45-49	94.8	2.0	0.1	3.1
50-54	92.2	2.3	0.1	5.4
55-59	90.4	4.2	0.1	5.3
60-64	86.6	8.1	0.5	4.9
65-69	83.3	15.1	0.0	1.6

	FULL TIME	PART TIME	POSTDOCS	UNEMPLOYED, SEEKING EMPLOYMENT
BY REGION				
Pacific	89.4	5.2	2.1	3.3
Mountain	91.3	4.2	1.5	3.0
West North Central	93.1	2.6	1.5	2.9
West South Central	92.0	1.8	2.3	3.9
East North Central	91.3	3.6	1.3	3.7
East South Central	92.2	1.6	2.1	4.0
Middle Atlantic	91.0	3.3	1.7	4.0
South Atlantic	91.4	3.9	1.8	2.9
New England	89.9	3.7	2.7	3.7

NOTES: As of March 1, 2004. Based on a population that excludes those either fully retired or otherwise unemployed but not seeking employment. ^a Or most recent. SOURCE: ACS salary survey 2004

CHEMISTS WHO HAVE NOT CHANGED JOBS

Those staying with the same employer post an average 4.3% annual gain

MEAN SALARY, \$ THOUSANDS	2003	2004	2003-04 INCREASE	% INCREASE
ALL CHEMISTS	\$83.4	\$87.0	\$3.6	4.3%

BY DEGREE

Bachelor's	64.9	67.8	2.9	4.5
Master's	73.7	76.8	3.1	4.2
Ph.D.	92.4	96.4	3.9	4.3

BY GENDER

Male	87.8	91.4	3.6	4.2
Female	70.3	73.8	3.5	4.9

BY ETHNICITY

Hispanic	73.8	77.3	3.5	4.8
Non-Hispanic	83.7	87.3	3.6	4.3

BY RACE

Asian	81.7	85.6	3.9	4.7
Black	70.7	73.7	3.0	4.2
White	84.1	87.7	3.6	4.3

BY CITIZENSHIP

Native born	83.2	86.7	3.5	4.2
Naturalized	88.7	92.5	3.8	4.3
Permanent resident	85.3	89.6	4.4	5.1
Other visa	68.6	72.6	4.0	5.8

BY EMPLOYER

Business/industry	88.4	92.2	3.8	4.4
Academic	70.3	73.0	2.7	3.9
Government	82.5	86.1	3.6	4.4

BY AGE

20-29	47.8	50.8	3.0	6.2
30-39	68.0	71.7	3.7	5.4
40-49	85.9	89.8	3.9	4.5
50-59	94.7	98.3	3.6	3.8
60-69	96.5	99.5	3.0	3.1

NOTE: Salaries are as of March 1 each year for chemists with full-time employment and who have not changed employer.
SOURCE: ACS salary survey 2004

excludes those fully retired or otherwise unemployed and not seeking employment.

The society defines chemists as those who identify any one of 15 chemical disciplines or specialties spelled out on the questionnaire as being most closely related to their current or latest employment. Also included as chemists are those with chemistry as their highest degree and who indicate computer science, law, or "other nonchemistry activities" as their specialty.

Chemical engineers are defined as those who identify this discipline as closest to their job, including those whose highest degree is in chemistry.

With the exception of the box on page 34, all data in this article are for chemists only.

These surveys are carried out under the general supervision of the ACS Committee on Economic & Professional Affairs. Since 1996, they have been conducted by Mary W. Jordan, workforce specialist for the ACS Department of Career Services. Questions about the content of the surveys should be directed to Jordan at (202) 872-4433.

The full report of the 2004 member survey will be available

SALARY GAINS FOR INDIVIDUAL CHEMISTS

Most chemists who didn't change jobs post gains

PERCENT WHO RECEIVED A RAISE	2001	2002	2003	2004
TOTAL	87.0%	85.0%	81.2%	80.8%

BY DEGREE

Bachelor's	84.9	81.8	83.0	80.8
Master's	85.5	83.8	82.2	81.8
Ph.D.	88.1	86.4	80.4	80.5

BY EMPLOYER

Business/industry	86.9	84.6	81.2	83.1
Academia	87.8	85.6	79.5	73.8
Government/other	85.9	90.3	92.4	86.9

BY AGE

20-29	91.6	86.4	90.7	87.5
30-39	90.4	88.3	84.2	85.1
40-49	86.8	86.1	81.9	82.1
50-59	85.9	83.1	79.4	77.5
60-69	79.4	76.6	75.9	73.6

NOTE: Percent of individual chemists employed full time by the same employer and who received a raise between March 1 and March 1 of the succeeding year.

ANNUAL SALARY GAIN FOR THOSE WHO RECEIVED A RAISE

MEDIAN INCREASE	2001	2002	2003	2004
TOTAL	4.9%	4.8%	4.2%	4.0%

BY DEGREE

Bachelor's	5.0	4.9	4.4	4.2
Master's	4.9	4.8	4.2	3.9
Ph.D.	4.8	4.8	4.1	4.0

BY EMPLOYER

Business/industry	5.1	5.0	4.3	4.0
Academia	4.3	4.2	3.8	4.0
Government/other	4.3	4.9	4.0	3.5

BY AGE

20-29	7.7	7.5	6.3	5.1
30-39	6.0	5.8	5.1	4.7
40-49	4.8	4.6	4.2	4.0
50-59	4.2	4.2	3.8	3.6
60-69	4.0	3.8	3.5	3.1

ANNUAL SALARY GAIN INCLUDING THOSE WHO DID NOT GET A RAISE

MEDIAN INCREASE	2001	2002	2003	2004
TOTAL	4.3%	4.2%	3.5%	3.4%

BY DEGREE

Bachelor's	4.1	4.1	3.8	3.6
Master's	4.3	4.2	3.7	3.4
Ph.D.	4.3	4.3	3.4	3.3

BY EMPLOYER

Business/industry	4.6	4.3	3.7	3.6
Academia	4.0	3.9	3.2	2.7
Government/other	4.0	4.8	3.9	3.6

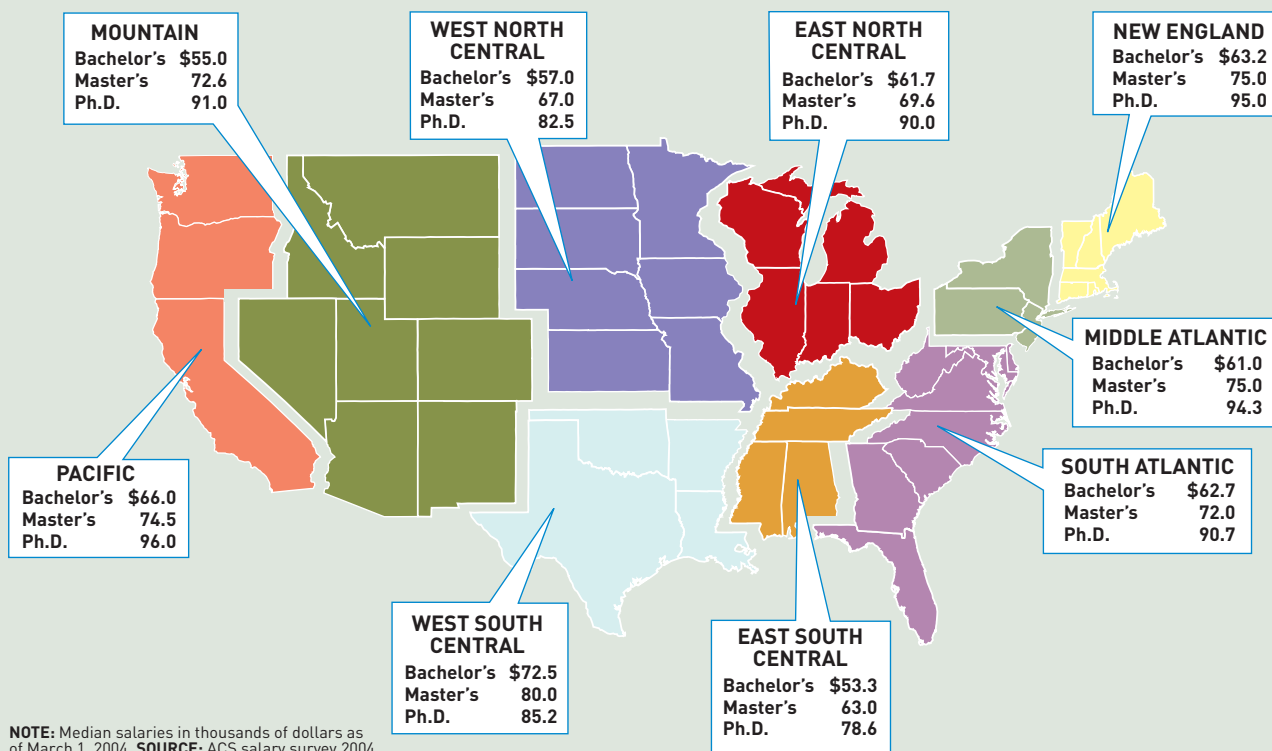
BY AGE

20-29	6.7	6.4	5.7	4.7
30-39	5.5	5.3	4.4	4.2
40-49	4.3	4.2	3.7	3.5
50-59	3.9	3.8	3.2	3.0
60-69	3.4	3.1	3.0	2.5

NOTE: Median percent salary increases are for individual chemists from March 1 to March 1 of succeeding years and who were employed full time by the same employer for the period. **SOURCE:** ACS salary survey 2004

SALARIES BY GEOGRAPHY

Chemists' pay tends to be lower in the South, higher on the West and East Coasts



this fall for \$250 from the American Chemical Society, Office of Society Services, 1155—16th St., N.W., Washington, DC 20036; phone (202) 872-4600.

DEMOGRAPHICS. These salary and employment surveys provide the most extensive and current data on the demo-

graphics of working domestic ACS members. For instance, 25.9% of respondents to this year's survey are women, up from 19.6% 10 years ago. This year, 35.1% of bachelor's chemists are women, as are 34.7% of master's and 20.4% of Ph.D.s.

This increasing penetration by women into chemistry is far from uniform. By

work specialty, it varies from 17.4% of those in organic chemistry to 34.5% of those in general chemistry and 41.7% of those in chemical education. By highest degree, the range is from 17.9% of those with organic chemistry degrees being women to 42.9% of those with chemical education degrees.

Women chemists are still getting the short end of the stick in academia. A modest 14% of full professors of chemistry are women, as are 30% of both associate and assistant professors. By the nature of the institution, 18% of the chemistry faculty at Ph.D.-granting departments are women. This share moves up to 31% for faculty of departments that offer the bachelor's as the highest degree.

A detailed analysis by type of employer shows that 55.8% of chemists work in manufacturing. A further breakdown by age brings out the big swing toward employment in the pharmaceutical industry. Of respondents up to 39 years old, 32.6% work in pharmaceutical and related operations. This compares with only 19.1% of chemists 40 years and older. To counterbalance this, the percentage of chemists working in chemical and other nonpharmaceutical manufacturing drops from 34.8% of those 40 and over to 27.4% of those up to 39.

Another area of growth is analytical and

SALARIES OF ALL CHEMISTS BY EXPERIENCE

Veteran chemists earn about 70% more than newcomers who are five to nine years beyond their bachelor's degree

MEDIAN SALARY, \$ THOUSANDS	YEARS SINCE BACHELOR'S DEGREE									
	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	ALL
ALL CHEMISTS	\$42.0	\$55.0	\$69.0	\$79.0	\$87.0	\$93.0	\$93.0	\$95.5	\$95.0	\$82.0
BY GENDER										
Male	42.3	56.7	71.0	82.0	90.0	95.4	95.3	99.0	98.0	86.4
Female	40.3	53.0	64.5	70.0	78.9	79.0	79.0	77.4	79.0	67.3
BY DEGREE										
Bachelor's	42.0	50.0	56.5	68.3	71.0	78.0	78.9	80.0	78.0	62.0
Master's	—	57.0	66.4	71.7	76.0	81.3	81.6	79.9	73.0	72.3
Ph.D.	—	70.0	75.0	84.0	92.4	101.0	103.5	102.8	99.7	91.6
BY EMPLOYER										
Industry	43.0	57.6	75.0	85.8	91.7	101.0	100.6	104.7	101.5	88.0
Academia	29.0	45.0	48.1	52.0	61.4	63.0	67.6	78.0	85.0	62.0
Government/other	—	58.0	66.7	72.2	84.3	84.0	86.0	99.8	102.3	85.0

NOTE: As of March 1, 2004. **SOURCE:** ACS salary survey 2004

INDUSTRIAL CHEMISTS: SALARY SPREAD

Difference between pay of top and bottom percentiles grows with work experience

MEDIAN SALARY, \$ THOUSANDS	YEARS SINCE BACHELOR'S DEGREE									OVERALL MEDIAN
	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
BACHELOR'S										
90%	\$56.0	\$68.7	\$79.0	\$94.0	\$104.2	\$120.0	\$118.4	\$128.0	\$141.0	\$100.0
75%	49.4	60.0	70.7	80.0	88.0	100.0	97.0	101.5	107.9	80.7
50%	43.0	50.0	60.0	69.4	72.5	84.0	80.0	79.2	80.0	63.0
25%	38.0	43.2	50.0	57.9	59.0	65.0	63.0	64.5	65.0	49.0
10%	33.0	38.0	42.8	45.0	50.0	54.8	41.0	52.0	57.0	40.0
MASTER'S										
90%	—	70.5	90.0	103.0	117.5	122.5	129.0	130.0	120.0	115.9
75%	—	65.0	75.4	88.2	94.0	105.0	106.0	105.0	103.6	95.0
50%	—	58.1	69.0	75.0	80.4	85.6	90.8	87.0	90.0	76.0
25%	—	50.0	60.0	65.0	70.0	75.0	70.9	70.0	73.0	63.3
10%	—	46.0	50.0	57.7	54.0	64.0	58.0	59.0	62.2	51.9
PH.D.										
90%	—	96.0	106.0	126.0	142.0	160.0	170.0	174.0	180.0	150.0
75%	—	89.0	96.0	107.5	117.3	132.6	138.0	137.9	134.0	120.0
50%	—	81.2	86.8	94.0	100.0	112.0	112.0	115.7	110.1	100.0
25%	—	72.0	75.9	82.0	87.5	97.0	95.1	96.0	93.0	86.0
10%	—	65.0	68.0	70.9	76.0	85.0	81.0	80.0	76.0	74.0

HOW TO READ THIS TABLE: Using the example of bachelor's chemists five to nine years after they have received their bachelor's degree, 90% have salaries of \$68,700 or less, 75% have salaries of \$60,000 or less, 50% have salaries of \$50,000 or less, 25% have salaries of \$43,200 or less, and 10% salaries of \$38,000 or less. **SOURCE:** ACS salary survey 2004

INDUSTRIAL SALARIES BY GENDER

Full salary parity for women is not yet achieved, but it is getting closer

YEARS SINCE BACHELOR'S DEGREE	BACHELOR'S			MASTER'S			PH.D.		
	MEN	WOMEN	WOMEN AS % MEN	MEN	WOMEN	WOMEN AS % MEN	MEN	WOMEN	WOMEN AS % MEN
2-4	\$45.0	\$42.7	95%	—	—	—	—	—	—
5-9	51.0	50.0	98	\$58.3	\$57.5	99%	\$82.5	\$80.0	97%
10-14	61.0	55.0	90	69.7	66.7	96	87.0	85.1	98
15-19	70.0	67.0	96	79.9	71.0	89	93.5	94.0	101
20-24	73.1	69.8	95	81.3	79.4	98	100.0	95.0	95
25-29	85.9	76.0	88	87.0	82.5	95	113.4	105.0	93
30-34	82.0	65.4	80	90.0	94.4	105	113.0	110.0	97
35-39	82.8	75.4	91	90.0	73.3	81	115.7	113.0	98
40+	78.7	—	—	93.5	—	—	111.5	—	—

NOTE: Median base salaries in thousands of dollars of chemists with full-time industrial jobs as of March 1, 2004. Where no data are shown, the sample was too small, fewer than 15, to provide meaningful data. **SOURCE:** ACS salary survey 2004

research services, which claim 11.9% of younger chemists but only 8.0% of older ones. On the other hand, government service is on the wane for chemists: Just 4.5% of younger chemists have government jobs compared with 8.6% of older ones.

By ethnicity, 2.6% of 2004 respondents are Hispanic. This number is far below the 12% of the U.S. population that is Hispanic. By race, blacks, also about 12% of the population, remain seriously underrepresented in chemistry at 2.1%. Asians, about 4% of the population, account for 11.9% of chemists. This leaves whites at 83.7% and "other" at 2.1%. Those with bachelor's degrees are the least racially di-

verse group, being 90.2% white. At the Ph.D. level, 81.6% are white.

Another breakdown of 2004 respondents is by citizenship status: 78.5% are U.S. native born, 11.0% are naturalized, 6.2% are permanent residents, and 4.4% are on visas. Again, the bachelor's degree cohort is the least diverse; 93.4% are native born, whereas 72.3% of Ph.D.s are native born.

A really significant change in the demographics of the chemical profession in recent years is in the median age of its practitioners. It is up from 41 years old as recently as 1991 to age 46 in 2004. Such an increase is not unique to chemists. It largely reflects the impact of the big baby boom

generation—those born between 1947 and 1968—as it ages and passes up through the national workforce.

By gender, the median age of male chemists is six years older than female chemists'. By degree, Ph.D. graduates are five years older than bachelor's. By employer, industry has the youngest chemist workforce, with a median age of 45, and government has the oldest, 50; academia's is 49. By citizenship status, those on visas are by far the youngest, at a median of 35, and naturalized citizens are the oldest, at 49.

EMPLOYMENT. Over the years, the unemployment rate among chemists responding to ACS's annual surveys has ranged between 0.9% and this year's high of 3.6%. Even a 3.6% rate is still quite low as judged by national standards. However, it is possible that the jobless rates for chemists as measured by ACS may be slightly low in absolute terms as a result of some reluctance among those unemployed to respond. Still, the ACS-measured rate remains a very reliable indicator of the state of the chemists' job market. An unemployment rate of up to 1.5% indicates nearly full employment, and anything over about 3% indicates a tough job situation for chemists.

Industrial chemists continue to take the brunt of the weakness in the chemical job market. According to the latest survey, 5.3% of chemists in nonmanufacturing industries are unemployed, as are 4.4% of those in manufacturing. For those in academia and government, unemployment remains much lower: 1.6% and 1.3%, respectively.

In line with this, chemists in marketing have been particularly hard-hit; their unemployment rate is at 8.1%. For those in production, it is 5.0%. Women seem to be doing a little better than men, with 3.1% unemployment compared with 3.8%. This difference may be partly due to women being more likely than men to have part-time jobs: 5.3% compared with 2.9% of men this year. This pattern has traditionally been the case. Also, women are more likely than men to be employed in academia.

The latest survey also shows the usual profile of generally increasing unemployment with increasing age, from 1.9% for those who are 25 to 29 years old to 5.4% for those who are 50 to 54.

SALARIES. Data on salary increases and trends derived from the ACS surveys must be interpreted with care. One way is to compare the differences between the medians from one survey with the corresponding medians from the year-earlier survey.

This approach, however, suffers from the uncertainties inherent in measuring relatively small numbers—salary increases—as the difference between two much larger numbers, the median salaries derived from two surveys done one year apart and over different member samples.

This approach measures the gains for chemists as a group. It does not include gains for individuals from growing responsibilities and experience and from promotions.

This year, it yields the 2.5% median increase to \$82,000 for this year's survey respondents from \$80,000 for 2003 respondents. Increases measured this way for subgroups of the membership are irregular. For instance, they range this year from 1.4% for master's chemists to 3.9% for bachelor's.

The other approach is to analyze the data provided in answer to the survey question that asks each year for salaries as of both March 1 of the current year and March 1 of the previous year. It tends to give more consistent results, because it is derived entirely from data provided by the respondents to a single survey. This approach measures the total gains for chemists as individuals.

Median salaries for any large, stable, and long-established workforce group such as the chemical profession would be expected to increase over the long term more or less with inflation. Chemists have done better than that over the past decade, with a 47% gain in salaries during a period that showed a 27% gain in the cost of living. However, this apparent 16% real gain in median salary can be accounted for by the median 2004 chemist being five years older than the median 1994 chemist.

The mean salary gains for respondents

ACADEMIC SALARIES

Hierarchy of academia is clearly reflected in salaries

MEDIAN SALARY, \$ THOUSANDS	9- TO 10-MONTH CONTRACTS		11- TO 12-MONTH CONTRACTS	
	NON-PH.D. SCHOOL	PH.D. SCHOOL	NON-PH.D. SCHOOL	PH.D. SCHOOL
Full professor	\$69.5	\$99.5	\$98.6	\$123.6
Associate professor	52.3	66.0	79.4	79.0
Assistant professor	45.2	56.9	64.0	63.0

NOTE: As of March 1, 2004. SOURCE: ACS salary survey 2004

INDUSTRY SALARIES

Managers in big companies, not unexpectedly, are paid the most

\$ THOUSANDS BY WORK FUNCTION	BACHELOR'S	MASTER'S	PH.D.
Analytical services	\$54.0	\$69.6	\$91.5
Applied research	60.4	73.0	96.0
Basic research	53.5	75.0	100.0
Chemical information	74.0	72.6	85.4
Computers	—	—	94.0
General management	88.5	90.0	129.4
Health & safety	75.2	86.0	98.0
Marketing & sales	79.5	85.0	100.0
Patents	—	—	130.0
Production/QC	61.1	72.2	91.8
R&D management	80.0	103.0	125.0

BY SIZE OF EMPLOYER	BACHELOR'S	MASTER'S	PH.D.
Fewer than 50	63.0	80.0	90.0
50-99	52.0	67.6	97.7
100-499	55.0	70.7	95.0
500-2,499	63.0	75.5	97.8
2,500-9,999	66.1	78.4	100.0
10,000-24,999	70.0	83.8	100.0
25,000+	69.2	78.0	106.1

NOTE: As of March 1, 2004. SOURCE: ACS salary survey 2004

to the 2004 survey who had the same employer in March 2003 as in March 2004 were particularly consistent. For all respondents, the mean 2004 salary was \$87,000, 4.3% higher than the \$83,400 they reported for 2003. This rate of gain was consistent throughout the subgroups of working ACS members. By degree, it ranged only from 4.2% for master's degree chemists to 4.5% for bachelor's; by employer, from 3.9% for academics to 4.4% for both industrial and government

chemists; and from 4.2% for men to 4.9% for women.

Of chemists who didn't change jobs, 80.8% received a salary increase. This percentage was down slightly from 81.2% the previous year and substantially down from 87.0% in 2001. The median increase for those awarded a raise in 2003-04 was 4.0%. When those who did not receive a raise are included, the median increase drops to 3.4%.

Salaries by geographic region tend to be somewhat irregular when measured year-to-year. Chemists in New England, the Middle Atlantic Region, and on the West Coast, however, seem to hold the edge.

Gender is slowly becoming a less critical factor in chemists' salaries. Overall, men apparently retain a significant advantage: The median for all women responding to the 2004 survey is \$67,300, only 78% of the \$86,400 median for men. But much of this difference is accounted for by women being five years younger than men and less likely to have a Ph.D.

Comparison of the salaries of men and women industrial chemists with the same highest degree and the same amount of experience reveals an increasingly level playing field. For instance, for Ph.D.s, women's

salaries hold at close to 97% those of men for all levels of experience up to 35 to 39 years beyond the bachelor's degree.

Analysis of industrial chemists' salaries by work function confirms the advantages of being a manager. As is usual, those in management do the best; for example, Ph.D.s in general management posted a median salary of \$129,400 in 2004, followed by those in R&D management at \$125,000. Among those at the lower end of the scale are chemical information, \$85,400, and production, \$91,800.

It continues to be advantageous to work for a big company. Ph.D.s at firms with 25,000 employees or more had a median salary of \$106,100 in 2004. This was considerably more than the \$95,000 for those at firms with 100 to 499 employees.

In academia, achieving the rank of full professor remains essential to the good life. The median for 11- to 12-month contracts for full professors at Ph.D.-granting schools of \$123,600 is competitive with the salaries

BONUSES

Provide a useful income boost for many industrial chemists

	INDUSTRY/ BUSINESS	ACADEMIA	GOVERNMENT	ALL
Percent eligible for bonus	67%	5%	43%	50%
Percentage of those eligible who received a bonus	91%	86%	84%	90%
Median bonus awarded	\$6,500	\$2,000	\$1,500	\$6,000

SOURCE: ACS salary survey 2004

CHEMICAL ENGINEERS

Doing Better Than Chemists

The limited analysis that can be done of the small sample of 427 respondents to the 2004 survey who identified themselves as chemical engineers confirms their traditional salary advantage over chemists. It also indicates that 93.4% of them had full-time jobs and 3.3% were unemployed but seeking employment. Of the remainder, 2.3% were working part time and 0.9% were on postdocs.

As has long been the case, the salary advantage for chemical engineers is particularly large at the bachelor's degree level. For those working in industry, the median base salary of \$73,000 for chemical engineers was \$10,000 higher than the \$63,000 for chemists. For master's, the edge for chemical engineers was \$93,000 over \$76,000. At the Ph.D. level, it is smaller: \$101,600 over \$100,000.

By gender, only 13% of chemical engineers are women; this is half of the 26% for chemists.

In other ways, there are not major differences in the demographics. By race, 82% of chemical engineers are white, as are 84% of chemists. Asians are well represented in both disciplines: 15% of chemical engineers and 12% of chemists. By citizenship, 76% of chemical engineers are U.S. native born, as are 79% of chemists. Hispanics claim 2.6% in both cases.

of senior industrial chemists. And it is far higher than the \$79,000 median for associate professors at the same institutions.

For chemists, bonuses are a factor primarily for those in industry. In 2004, 67%

of industrial chemists were eligible for a bonus; 91% of those eligible received one, with a median value of \$6,500. For government chemists, a lower 43% were eligible, of whom 84% were awarded one at

a median of \$1,500. Only 5% of academics were eligible.


TRENDS. The employment situation remains tough for chemists. As brought out by ACS's latest starting salary survey (C&EN, April 19, page 51), chemists graduating in 2003 had a harder time finding full-time jobs than did their year-earlier predecessors. Also, their salaries tended to be lower, partly because more of them took lower paying academic positions.

The latest salary and employment survey indicates that working ACS members face a still-weakening job situation that has crumbled badly over the past three years.


There are two brighter signs, however. One is that, although statistically the job market remains the weakest it has been since ACS began measuring it on an annual basis, the adverse impact on the profession remains less severe than it was during the sudden downturn that hit after the really booming chemical decade of the 1960s. And the other encouraging sign is that chemists who are holding on to established jobs are continuing to post respectable annual salary gains. ■

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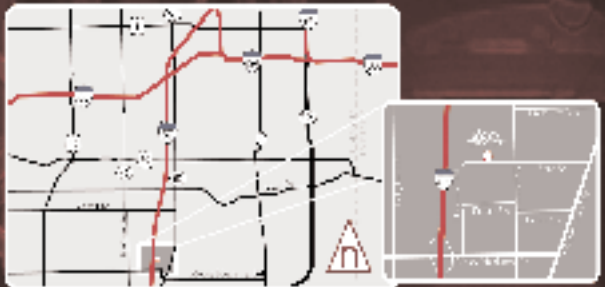



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