

SALARIES OF CHEMISTS FALL

Unemployment reaches new heights in 2009 as **RECESSION HITS** profession hard

DAVID HANSON, C&EN WASHINGTON

THE ECONOMIC recession has taken its toll on chemists. Despite holding up fairly well in previous years, chemists in 2009 found that jobs were more difficult to get and their median salaries were falling pretty much across the board.

On the basis of results from the 2009 American Chemical Society comprehensive salary and employment status survey, the median salaries of all chemists in early 2009 decreased by 3.2% compared with the year before, to \$90,000 from \$93,000. The survey also determined that the unemployment rate for chemists rose to 3.9% in 2009, marking the highest percentage of chemists out of work in at least the past 20 years.

The ACS annual survey, which was done in March 2009, indicates that the prolonged recession has had a negative impact in all areas of chemists' professional lives. Chemists with bachelor's degrees seem to be taking the brunt of the economic downturn. For example, the data show that although only 2.4% of chemists with bachelor's degrees reported that they were unemployed when the survey was done in 2008, that number rose to a very high 5.6% unemployed by 2009. For these same bachelor's degree chemists, the median salary also took a plunge, falling from \$73,000 in 2008, to \$66,700 in 2009, a drop of 8.1% in a single year.

Ph.D. chemists have fared somewhat better. The survey found that unemployment rose from 1.9% in 2008 to 3.3% in

INDUSTRIAL SALARIES BY WORK FUNCTION

Computer work takes highest salary spot

\$ THOUSANDS	BACHELOR'S	MASTER'S	PH.D.
RESEARCH			
Basic research	id	id	\$123.5
Applied research	\$80.0	\$91.6	110.0
MANAGEMENT/SALES			
R&D management	69.0	79.2	142.0
General management	88.0	103.0	135.2
Marketing/sales	88.1	100.0	112.3
ANALYTICAL			
Analytical services	65.0	84.0	107.0
Production/quality control	69.0	79.9	121.7
OTHER			
Health/safety	80.0	96.9	121.2
Chemical information	59.4	78.1	107.1
Computers	100.0	118.0	147.3
Patents	80.0	127.5	141.0

NOTE: Median full-time base salaries as of March 1, 2009. **id** = insufficient data to be meaningful. **SOURCE:** ACS salary survey 2009

EMPLOYMENT STATUS

Recession takes big toll on chemical employment

	FULL-TIME	OTHER THAN FULL-TIME EMPLOYMENT			TOTAL
		PART-TIME	POSTDOC	UNEMPLOYED/SEEKING EMPLOYMENT	
1999	92.9%	2.7%	2.1%	2.3%	7.1%
2000	92.9	3.0	2.1	2.0	7.1
2001	94.6	2.5	1.4	1.5	5.4
2002	92.2	3.0	1.5	3.3	7.8
2003	92.1	3.0	1.4	3.5	7.9
2004	90.9	3.6	1.9	3.6	9.1
2005	90.8	4.1	2.0	3.1	9.2
2006	91.3	3.4	2.3	3.0	8.7
2007	92.3	3.6	1.7	2.4	7.7
2008	92.5	3.9	1.3	2.3	7.5
2009	89.4	3.2	2.5	3.9	9.6

NOTE: As of March 1 of each year. Based on population that excludes those fully retired or otherwise not employed and not seeking employment. **SOURCE:** ACS salary survey 2009

2009 for chemists with doctorate degrees. Also, the median salary for Ph.D. chemists fell 1% from the prior year, going from

\$101,000 in 2008 to \$100,000 in 2009.

Those with a master's degree as the highest degree saw jobs and income reductions on a similar scale to Ph.D. chemists. Unemployment for master's chemists was up to 4.2%, an increase from 3.6% from the year before. And the median salary for a master's degree chemist fell only 1.2% last year, from \$82,000 to \$81,000.

The 2009 data also show that fewer chemists indicated they had part-time employment. Only 3.2% of chemists indicated they had part-time jobs last year, a decrease from 3.9% in 2008 and the lowest number since the 2003 survey when only 3.0% worked part-time. There was a big increase in the number of chemists holding postdoctoral positions, however, nearly doubling from 1.3% of respondents in 2008 to 2.5% in 2009. This was the highest percentage of chemists indicating they were postdocs in more than 10 years. These numbers may indicate that young chemists are holding on to postdocs longer than in previous years and that part-time positions are not as readily available.

Salaries dropped in almost all measured categories of the survey. The median salary for industrial chemists in 2009 fell 2.3%, and government median salary dropped 3.1%, the survey found. Hispanic chemists suffered the greatest median salary drop among all groups, with a 9.3% decrease from a year earlier. Older chemists held their own and even experienced salary growth. Specifically, chemists from 50 to 59 years old had a median salary growth of 0.3% from 2008, and those over the age of 60 reported a 1.7% increase.

The salary and employment decreases for last year marked the end of a sustained period of economic growth for chemists. Chemists' median salaries had been steadily increasing

for more than 10 years at a pace greater than inflation. Employment has generally been greater than 97% for many years.

SALARY TRENDS

Salaries fall in all groups as recession takes its toll

\$ THOUSANDS	BACHELOR'S		MASTER'S		PH.D.		ALL CHEMISTS	
	CURRENT \$	CONSTANT \$ 2009	CURRENT \$	CONSTANT \$ 2009	CURRENT \$	CONSTANT \$ 2009	CURRENT \$	CONSTANT \$ 2009
1999	\$50.1	\$64.5	\$61.0	\$78.6	\$76.0	\$97.9	\$68.0	\$87.6
2000	53.1	66.2	64.4	80.2	79.0	98.4	70.0	87.2
2001	55.0	66.6	65.0	78.7	82.2	99.6	73.0	88.4
2002	58.0	69.2	68.5	81.7	85.2	101.6	76.5	91.2
2003	59.7	69.6	71.3	83.1	90.0	104.9	80.0	93.3
2004	62.0	70.4	72.3	82.1	91.6	104.0	82.0	93.1
2005	63.0	69.2	74.0	81.3	93.0	102.2	83.0	91.2
2006	65.2	69.4	77.5	82.5	95.0	101.1	85.0	90.5
2007	69.7	72.1	80.0	82.8	96.7	100.1	88.0	91.1
2008	73.0	72.7	82.0	81.7	101.0	100.6	93.0	92.7
2009	66.7	66.7	81.0	81.0	100.0	100.0	90.0	90.0
AVERAGE ANNUAL CURRENT-DOLLAR SALARY CHANGE								
2008-09	-8.6%		-1.2%		-1.0%		-3.2%	
1998-09	3.3		3.3		3.2		3.2	

NOTE: Median base salaries for those with full-time jobs as of March 1 each year. Average annual increase in Consumer Price Index is 1.4% for 2008-09 and 2.6% for 1999-09.

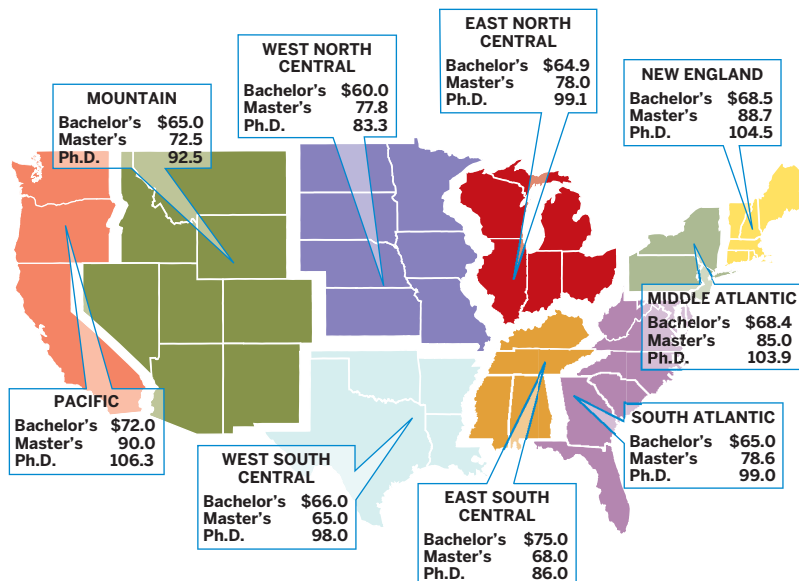
SOURCES: ACS salary surveys, Bureau of Labor Statistics (Consumer Price Index data)

The ACS Department of Member Research & Technology, which performs the annual survey, notes that the trend for unemployment among chemists seems to match the trend for unemployment in the general population, except that it is roughly one-half the rate. The national unemployment rate as reported by the Bureau of Labor Statistics in March 2009 was 8.6%.

THE 2009 annual survey was sent to a random sample of 20,000 regular ACS members under the age of 70, who were most likely to be in the domestic workforce. Ultimately, 7,149 usable responses to the survey were received by ACS for a response rate of 35.7%, about identical to the response in 2008 but down sharply from the nearly 50% response rates that were characteristic of the 1990s.

CHEMIST'S SALARIES BY REGION

New England, Pacific Coast continue to pay highest salaries



NOTE: Median full-time base salaries in thousands of dollars. **SOURCE:** ACS salary survey 2009

The survey was conducted and analyzed by Gareth S. Edwards and Jeffrey R. Allum of the member research and technology office, under the guidance of the ACS Committee on Economic & Professional Affairs (CEPA).

survey is the slow shift from chemists being native-born U.S. citizens to naturalized citizens and permanent foreign residents. The survey found that native-born U.S. chemists made up 74.4% of the surveyed chemical workforce, a drop from the nearly 80% level seen in the previous few years. Filling out the remaining quarter of the

Aside from the generally negative numbers for salaries and employment, the 2009 survey data present a picture of chemists as members of a diverse and growing profession. Notably, the number of women in the workforce relative to the number of men continues to rise. In 2009, the survey found that 73.5% of the respondents were men, a slight decrease from 73.9% in 2008. For comparison, in 1995, 78.5% of those responding were men.

The overall diversity of ACS members in the workforce also is increasing. The survey found that African American chemists have increased from 1.8% of the total in 2008 to 2.8% in 2009, the first significant increase in this area in several years. The percentage of chemists of Hispanic ethnicity rose from 2.7% of the chemical workforce to 3.6%, and chemists who identify themselves as Asian increased to 13.9% in 2009, up from 10.8% the year before. All of these percentages represent record-high diversity numbers for the chemical profession.

Another change in the chemical world marked by this ACS

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PH.D. FACULTY SALARIES BY GENDER

Women faculty salaries are still lower than men's in several areas

\$ THOUSANDS	MEN	WOMEN	WOMEN AS % OF MEN
FULL PROFESSOR			
Bachelor's granting	\$81.2	\$81.7	101%
Master's granting	88.0	id	
Ph.D. granting	120.8	100.0	83
ASSOCIATE PROFESSOR			
Bachelor's granting	60.0	57.1	95
Master's granting	66.4	id	
Ph.D. granting	83.3	76.9	92
ASSISTANT PROFESSOR			
Bachelor's granting	53.3	51.7	97
Master's granting	66.4	id	
Ph.D. granting	60.0	60.0	100

NOTE: Median salaries for nine-month contracts as of March 1, 2009. **id** = insufficient data to be meaningful.

SOURCE: ACS salary survey 2009

surveyed workforce in 2009 were naturalized citizens, who represented 12.3% of chemists last year, an increase from 10.9% in 2008; and chemists who are classified as permanent residents, who increased from 6.5% in 2008 to 8.3% in 2009. The number of those working in the U.S. with other types of visas was also higher, totaling 5.0% of the workforce, more than doubling from 2.3% responding to the 2008 survey. One conclusion that might be drawn from these data is that foreign-born scientists continue to regard working in the U.S. as a chemist as a good career choice.

The survey found a fairly sharp increase in the percentage of working ACS members who hold a bachelor's as their highest de-

gree. The proportion of bachelor's degree chemists in the workplace had been falling steadily for at least the past 15 years, but it rose to 19.4% of the total in 2009, up from 17.9% the year before. Chemists with bachelor's degrees had been 24.3% of the workforce in 1995. These data are consistent with data from another ACS report that shows the number of chemistry bachelor's degrees awarded by U.S. universities has been rising recently (C&EN, Nov. 23, 2009, page 38).

A secondary impact of the increase in number of bachelor's

degree chemists is that the median age of chemists is falling. The ACS survey found that the percentage of chemists under the

age of 40 rose to 31.3% in 2009, the first time it's been over 30% in three years. The average age of chemists in the 2009 survey was 47, a drop of about one year from the last survey. Women generally were also much younger, averaging about 41 years of age, than the male respondents, who averaged 49 years old.

The age difference in genders is significant because salaries, whether in industry, government, or academia, are directly related to years of experience. Median salaries for all men and all women chemists are almost identical at two to four years of experience, but then the salaries begin to diverge and the disparity grows over time. At 10 to 14 years of experience, male chemists surveyed were found to have a median salary of \$78,000, but women are getting only \$65,100, or 83% of the salary of their male counterparts. At 30 to 34 years of experience, women are earning just 72% of the men's median salary, or \$81,400 compared with \$113,400.

The ACS survey has more detailed data on the median salaries of men and women in industry relative to their experience. It shows that men and women with bachelor's degrees have very nearly equal salaries

ACADEMIC SALARIES

Most faculty salaries rose slightly in 2009

\$ THOUSANDS	NINE-MONTH CONTRACTS		11- TO 12-MONTH CONTRACTS	
	NON-PH.D. SCHOOL	PH.D. SCHOOL	NON-PH.D. SCHOOL	PH.D. SCHOOL
Full professor	\$78.0	\$115.0	\$97.5	\$149.0
Associate professor	61.4	78.0	62.7	96.5
Assistant professor	53.2	70.7	id	67.0
Instructor/adjunct	37.8	50.0	50.0	50.0
Research appointment	id	id	id	42.0

NOTE: Median salaries. **id** = insufficient data to be meaningful. **SOURCE:** ACS salary survey 2009

INDUSTRIAL CHEMISTS' SALARIES BY EXPERIENCE AND GENDER

Salaries of younger women are on par with those of male peers

YEARS SINCE BACHELOR'S DEGREE	BACHELOR'S			MASTER'S			PH.D.		
	MEN	WOMEN	WOMEN AS % OF MEN	MEN	WOMEN	WOMEN AS % OF MEN	MEN	WOMEN	WOMEN AS % OF MEN
2-4	\$46.0	\$47.9	104%	na	na	na	na	na	na
5-9	62.1	52.5	85	\$64.2	\$60.0	93%	\$86.0	\$92.0	107%
10-14	64.5	60.0	93	78.0	75.0	96	95.7	92.3	96
15-19	82.0	72.0	88	91.5	88.7	97	105.0	100.0	95
20-24	90.6	83.2	92	94.0	82.0	87	120.0	118.0	98
25-29	95.5	82.0	86	91.0	93.5	103	126.0	127.5	101
30-34	106.0	77.0	73	99.7	90.0	90	134.4	135.0	100
35-39	87.5	id		107.9	95.5	89	133.0	120.0	90
40 or more	90.0	id		105.0	id		130.0	103.5	80

NOTE: Median full-time base salaries as of March 1, 2009. **na** = not applicable. **id** = insufficient data to be meaningful. **SOURCE:** ACS salary survey 2009

in their early years of employment but their salaries quickly diverge with women earning between 80 and 90% of men's salaries. At the master's degree level, women earned a slightly lower median salary from the start, and the differences remained fairly level throughout the years with an exception being for those 25 to 29 years past their bachelor's degree, where salaries were slightly higher for women.

For industrial chemists with Ph.D.s, however, the survey found that median salaries of men and women were nearly equal for a long time, up to 34 years of experience. After that time of service, the salaries of women drop off somewhat until they are about 80% those of men at more than 40 years of experience.

Industrial chemists generally received the overall highest median salary in the survey, which is consistent with previous years, but some academic salaries reported for 2009 were edging above industrial pay. For instance, the median for a Ph.D. chemist in industrial management was \$142,000 according to the survey, and pay for Ph.D. chemists doing computer work was \$147,300. But full professors teaching under 12-month contracts at Ph.D.-granting universities had a me-

SALARIES OF CHEMISTS AS INDIVIDUALS

Median pay drops for all but oldest chemists

\$ THOUSANDS	2008	2009	CHANGE, 2008-09	
			\$ GAIN	% GAIN
ALL	\$93.0	\$90.0	-\$3.0	-3.2%
BY DEGREE				
Bachelor's	72.6	66.7	-5.9	-8.1
Master's	82.0	81.0	-1.0	-1.2
Ph.D.	101.0	100.0	-1.0	-1.0
BY GENDER				
Men	98.0	96.0	-2.0	-2.0
Women	75.5	71.0	-4.5	-6.0
BY ETHNICITY				
Hispanic	82.7	75.0	-7.7	-9.3
BY CITIZENSHIP				
Native born	91.5	89.5	-2.0	-2.2
Naturalized	103.8	100.8	-3.0	-2.9
Permanent resident	93.4	89.2	-4.2	-4.5
Other visa	70.0	70.0	0.0	0.0
BY EMPLOYER				
Industry/business	102.0	99.7	-2.3	-2.3
Government	96.0	93.0	-3.0	-3.1
Academia	70.4	69.0	-1.4	-2.0
BY AGE				
20-29	54.0	52.7	-1.3	-2.4
30-39	76.4	75.0	-1.4	-1.8
40-49	96.0	94.0	-2.0	-2.1
50-59	105.1	105.4	0.3	0.3
60-69	103.0	104.8	1.8	1.7

NOTE: Median salaries for full-time employed chemists as of March 1, 2009.
SOURCE: ACS salary survey 2009

dian salary of \$149,000. This is a huge jump from the median salary of \$120,600 reported in 2008, and may be an anomaly.

Industrial salaries for chemists vary depending on the specific job being done. For chemists with a bachelor's degree, the jobs paying least are those in chemical information and analytical services, with median pay in 2009 of \$59,400 and \$65,000, respectively. Higher pay goes to chemists with jobs in marketing and sales at \$88,100 and the highest to computer-related jobs, which reached \$100,000. For chemists with a master's as their highest degree, computers and marketing still offer relatively high salaries, but the survey found that working in the patent field paid the best, with a median salary of \$127,500 in 2009.

Chemists with a Ph.D. as the final degree received the highest median salary in industrial jobs, with the aforementioned computer positions paying the most at \$147,300 in 2009. Low-end salaries for Ph.D.s were for jobs in analytical services, at \$107,000, and in chemical information, at \$107,100.

In the academic world, some median salary categories went against the trend and actually rose last year, according to the

SALARIES FOR ALL CHEMISTS BY EXPERIENCE

Median salaries begin to fall after about 35 years of experience

\$ THOUSANDS	YEARS SINCE BACHELOR'S DEGREE									ALL ^a
	2-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	
ALL CHEMISTS	\$47.0	\$63.0	\$72.6	\$85.0	\$95.0	\$101.0	\$110.0	\$105.0	\$107.0	\$90.0
BY GENDER										
Men	47.0	65.0	78.0	89.0	99.0	105.0	113.4	108.6	110.5	96.0
Women	46.8	60.0	65.1	74.1	83.0	93.0	81.4	95.0	81.0	72.0
BY DEGREE										
Bachelor's	46.0	55.0	60.8	72.0	88.0	85.0	90.5	84.0	85.0	67.3
Master's	id	61.0	72.5	83.5	82.0	85.5	91.7	92.6	91.1	80.6
Ph.D.	id	75.4	79.0	88.2	103.0	112.0	120.0	120.0	114.0	100.0
BY EMPLOYER										
Industry	47.8	65.0	81.5	95.6	106.6	111.0	119.0	115.5	116.7	100.0
Government	id	61.9	85.0	90.6	97.9	95.0	109.3	98.3	130.0	94.4
Academia	35.3	51.0	56.5	61.8	64.7	73.0	81.7	84.5	96.4	69.0

NOTE: Median full-time salaries. ^a Respondents giving their age. **id** = insufficient data to be meaningful. **SOURCE:** ACS salary survey 2009

survey. Full professors teaching at a school without a chemistry Ph.D. program under a nine-month contract earned \$78,000 in 2009, a slight increase from \$76,000 reported the year before. Assistant and associate professors at these institutions also saw very small median salary increases. But full professors at Ph.D.-granting institutions contracted for nine months saw their median salary drop to \$115,000 from \$120,000 in 2008.

An interesting comparison arises for assistant professors teaching at Ph.D.-granting schools. Those working under 12-month contracts received a lower median pay of \$67,000 last year than did their equivalent colleagues working with nine-month contracts, who had a median salary of \$70,700.

The survey found that women were paid

about the same as men at universities. At schools granting the bachelor's degree as the highest degree, women full professors

ing to the survey. The greatest gap surveyed this year was for full professors working at schools granting Ph.D.s, where women were receiving just 83% of the median salary of their male colleagues, earning \$100,000 compared with \$120,800.

But there are a lot of fluctuations in these survey numbers from year to year. An example is the gender-specific median salary reported for associate professors at Ph.D.-granting institutions. In 2008, women in this category earned a median salary of \$80,600, which was 112% of what men in the same position reported. In 2009, the numbers were effectively reversed with men receiving

\$83,300, or 108% of the \$76,900 median salary of their female colleagues.

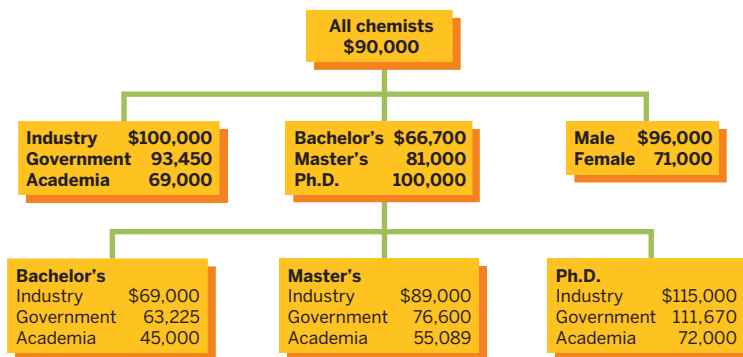
THE BASE SALARIES for many chemists, however, do not take into account supplemental income received as bonuses. In 2009, almost half of the chemists responding to the survey said that they were eligible to receive bonuses from their employer, and 90% of those eligible received a median bonus of \$9,000. Men were paid bonuses twice as large as those paid to women, the survey reports, with men receiving a median bonus of \$10,000 and women a median bonus of \$5,000. Industry bonuses tended to be highest, with chemists at manufacturing companies receiving a median bonus of \$11,750 and those in nonmanufacturing receiving \$5,600 in 2009. In academia and for government chemists, the median value for bonuses was \$2,000.

The ACS employment and salary survey was conducted more than a year ago and may not reflect the status of many chemists whose careers have been adversely impacted by the continuing recession. Companies have continued to lay off scientists and engineers, and universities have struggled with higher costs and lower revenues since the survey, so the decline in employment and median salaries for chemists likely has slipped further since the survey was completed.

The annual survey indicates that the prolonged recession has had a negative impact in all areas of chemists' professional lives. ■

MEDIAN BASE SALARIES FOR CHEMISTS

Base salaries were generally lower in 2009 than in 2008



NOTE: Median annual base salaries for chemists with full-time employment.
SOURCE: ACS salary survey 2009

received 101% of what men were paid. Similarly, women assistant professors at Ph.D.-granting universities were paid the same as men, a median salary of \$60,000, accord-

ACS MEMBERS IN THE WORKFORCE

Diversity in workforce showed strong growth in 2009

	1995	2000	2005	2006	2007	2008	2009
BY GENDER							
Men	78.5%	75.8%	74.9%	74.2%	74.6%	73.9%	73.5%
Women	21.5	24.2	25.1	25.8	25.4	26.1	26.5
BY DEGREE							
Bachelor's	24.3	22.1	19.9	19.6	18.9	17.9	19.4
Master's	16.9	17.4	17.0	17.7	17.3	18.0	17.3
Ph.D.	58.8	50.5	63.1	62.7	63.8	64.2	63.2
BY RACE							
American Indian	0.2	0.2	0.2	0.2	0.2	0.4	0.4
Asian	10.3	11.1	10.9	11.7	11.4	10.8	13.9
Black	1.4	1.9	1.9	1.9	1.9	1.8	2.8
White	85.8	85.5	85.8	84.3	84.5	84.8	81.2
Other	2.3	1.3	1.2	1.9	2.0	2.2	1.7
BY ETHNICITY							
Hispanic	2.3	2.5	2.6	2.8	3.0	2.7	3.6
BY CITIZENSHIP							
Native born	82.3	79.5	79.8	79.3	79.7	80.3	74.4
Naturalized	8.5	10.2	10.2	10.7	10.5	10.9	12.3
Permanent residents	7.1	6.9	6.5	6.5	6.2	6.5	8.3
Other visa	2.1	3.4	3.5	3.5	3.6	2.3	5.0
BY AGE							
Under 40	40.7	34.1	27.8	33.0	27.9	24.4	31.3

SOURCE: ACS annual salary surveys

BONUSES

Recession resulted in lower bonus payments last year

	INDUSTRY		GOVERNMENT	ACADEMIA	ALL
	MANUFACTURING	NONMANUFACTURING			
Eligible for bonus	77.4%	61.4%	39.5%	9.4%	49.2%
Percent of those eligible who received a bonus	92.8	87.3	91.4	73.9	90.3
Median bonus	\$11,750	\$5,600	\$2,000	\$2,000	\$9,000

SOURCE: ACS salary survey 2009

EMPLOYMENT DEMOGRAPHICS

Unemployment of chemists rises to highest level than in more than a decade

	EMPLOYED		POSTDOC	UNEMPLOYED/ SEEKING EMPLOYMENT
	FULL-TIME	PART-TIME		
ALL CHEMISTS	89.4%	3.2%	2.5%	3.9%
BY DEGREE				
Bachelor's	91.7	2.6	na	5.6
Master's	91.6	4.1	na	4.2
Ph.D.	89.5	3.2	4	3.3
BY GENDER				
Men	91.1	2.7	2.4	3.8
Women	88.2	4.5	3	4.2
BY RACE				
Asian	87.8	1.5	8.4	2.3
Black	88.6	4.9	2.7	3.8
White	91.1	3.3	1.5	4.1
BY AGE				
20-29	89.2	id	5.9	3.1
30-39	88.1	2.1	7.5	2.3
40-49	93.5	1.7	0.9	3.9
50-59	92.1	2.9	0.0	5.0
60-69	85.9	9.2	0.0	4.9

NOTE: As of March 1, 2009. Excludes those retired or otherwise unemployed but not seeking employment. **id** = Insufficient data to be meaningful. **na** = not applicable.

SOURCE: ACS salary survey 2009