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Starting Salaries

Chemistry and chemical engineering graduates in 2009 faced a tough job market and falling median salaries

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The severe national recession of the past several years is having a negative impact on the employment and the starting salaries of chemists and chemical engineers. The latest data from the American Chemical Society on graduates from 2009 found that median starting salaries fell about 5% for those receiving bachelor's and doctoral degrees compared with the previous year. New graduates with master's degrees appeared to have gotten a jump in pay.

The results from the ACS survey of employment and starting salaries also show that these recent graduates had a more difficult time finding permanent employment than did their predecessors.

Overall, the unemployment rate for respondents was somewhat higher than the national unemployment rate in 2009, and it was higher for bachelor's degree recipients than it had been for bachelor's degree chemists in at least a decade. The ACS survey found that in 2009, 15% of new bachelor's degree recipients were not employed, up from 14% the previous year. This breaks down to 12% of graduates seeking employment and 3% no longer looking for jobs.

Even worse, some 18% of graduates with master's degrees reported they were not employed, far above the 10% in 2008. And 9% of those with a Ph.D. as their highest degree reported that they were not employed, compared with 7% in 2008.

These numbers are especially high when compared with the unemployment figures of the Bureau of Labor Statistics for the same period. BLS reports that total civilian workforce unemployment at the end of 2009 was about 9%, lower than the

survey figures for both bachelor's and master's degree graduates that year. But the BLS unemployment rate for college graduates over the age of 25 was less than 5%, making survey respondents of all degree levels significantly less employed than the national average.

From the employment side, the data indicate that only 32% of bachelor's graduates reported they had full-time employment by late 2009. Just 23% of them held permanent jobs, whereas 9% were temporarily employed. In 2008, by contrast, the rate of full-time employment had reached a recent high of 40%.

Similarly, master's graduates reported a drop in the rate of employment, with just 43% holding full-time jobs in 2009, compared with 48% the previous year. For these 2009 graduates, 38% had permanent jobs and 5% were in temporary positions. Employment of doctorates fell, too, dipping to just 45% holding full-time jobs, down from a high of 54% in 2008.

Considering these poor employment numbers, the fact that median salaries for most newly employed graduates did not go down even further is a relief. The ACS survey found that the starting salaries for bachelor's degree recipients with less than 12 months of experience dropped by 5% in 2009, falling from a median of $40,000 in 2008 to $38,000 for 2009. For those with master's degrees and less than 12 months of technical experience, starting pay rose from $52,000 in 2008 to $60,000 in 2009. New Ph.D. graduates saw a drop in median starting salaries equivalent to that of the bachelor's graduates, going from $80,000 in 2008 to $76,250 in 2009, according to the survey.

These data come from the annual survey of new graduates conducted by Gareth S. Edwards and Jeffrey R. Allum of the ACS Department of Member Research Technology, which is under the guidance of the ACS Committee on Economic & Professional Affairs. The survey was sent to graduates in early October 2009, and data were collected until January 2010. For the 2009 study, more than 10,268 recent graduates were sent surveys, and a total of 2,429 usable responses were returned, a 24% response rate. This is the same response level as the most recent comparable ACS starting salary survey, which was conducted in 2007. Of the 2009 respondents, 289, or 12%, got their degrees in chemical engineering.

In addition to the mixed results on starting salaries, the ACS survey also collected data on types of jobs, size of employer, and gender. Grouping job types into broad categories, the survey found that government jobs pay the highest median starting salaries. Bachelor's degree graduates got $41,000 for government positions in 2009 and Ph.D. graduates received $82,500. This compares with median salaries of $36,400 and $50,000 for bachelor's and Ph.D. recipients, respectively, at academic jobs. Salaries for industry jobs fell in between at both degree levels, with bachelor's degree graduates receiving $38,400 and Ph.D. recipients getting $78,000. Data were insufficient to make a similar comparison for master's graduates.

For more specific work functions, the survey found that for bachelor's degree graduates, jobs involving chemical development and design offered the highest starting salary. The median salary for such jobs was $68,200, compared with jobs in production and quality control, at $43,300, or teaching, for which the median starting salary was $41,600.

In almost all categories measured by the survey, women were found to receive lower median salaries than men. For all respondents, men with a new bachelor's degree received $40,000, whereas women in the same category were paid $36,500. With a master's degree, men got $60,000 and women, $46,500. But at the doctorate level, starting salaries seemed to flip-flop, with men reporting $75,300 and women reporting $78,000.

One factor that can influence starting salary is the area of specialization. ACS found that most respondents receive degrees in classical areas of chemistry. General chemistry is cited by slightly more than 51% of those receiving bachelor's degrees, and organic chemistry is the largest specialty of Ph.D. graduates, claimed by about 27% of respondents. Another area many students choose is biochemistry, which attracted almost 27% of bachelor's respondents and 13% of Ph.D. graduates. Chemical engineering was also highly ranked, with 11% of bachelor's degrees being awarded in that field and nearly 15% of doctorates.

The choice of specialty among undergraduates may also play a part in the decision to pursue graduate work, and the ACS survey found that about half of those receiving bachelor's degrees decide to pursue advanced studies. In 2009, 47% of men receiving bachelor's degrees went to graduate school full time, as did 45% of women. The percentages of men and women continuing in school full time after a master's degree were 33% and 26%, respectively. These percentages are up about 10% from 2008; the rise may be in response to the difficulty in finding employment during the prolonged recession.

Most of the graduates deciding to go for further studies selected the chemistry professions. The ACS survey found that 32% of those with bachelor's degrees and 67% of those with master's degrees who chose to continue their studies did so in chemistry. About 8% of bachelor's and 11% of master's students opted for engineering, mostly chemical or biochemical. Bachelor's graduates also switched to the health field, with 24% of them pursuing medical degrees. A small number—about 8%—of bachelor's degree recipients indicated that they went into advanced studies in other fields such as education, law, or business.

If they did not choose to go to graduate school, graduates found themselves struggling in the difficult job market. Most graduates, regardless of degree level, looked for jobs using one of three methods. The most common method was to look for positions through electronic media job sites, and the number two method was to use the resources of formal placement services. The third most frequent way for chemists to look for a job was through informal channels.

The jobs that respondents get tend to be at universities. The survey found that, in 2009, 45% of employed graduates with bachelor's degrees held jobs in academia, along with 48% of master's degree holders and 55% of new graduates with Ph.D.s. The chemical industry—not including drug companies—hired 17% of bachelor's graduates, 19% of master's holders, and 15% of new doctorates. The pharmaceutical industry took about 5% of graduates from all levels. About 10% of graduates from all categories landed jobs with the government.

As in previous years, the 2009 survey found that Ph.D. graduates were quite satisfied with their jobs: More than 90% responded that their jobs were challenging and related to their field. But interestingly, 21% of new doctorates replied to the survey by saying that their jobs were not what they expected when they began their studies.

Respondents with bachelor's and master's degrees were slightly less enthusiastic about their positions, with 72% and 84%, respectively, responding that they found their jobs challenging.

Although the 2009 survey shows glimpses of positive data, such as an apparently strong jump in starting salaries for master's degree holders and a slight increase in the number of women attending graduate school versus 2008, the overall tenor of the survey for 2009 was that employment of respondents and their starting salaries are falling. Employment rates for bachelor's and master's degree recipients were the lowest in a decade in 2009, and the stubbornly high national unemployment rate offers no indication that employment of chemists has improved since then. Both salaries and job prospects for Ph.D. graduates have been erratic in recent years, an indication of how volatile the economy has become.

Data for those who have graduated since this survey also are likely to show downward trends, as layoffs of scientists in the pharmaceutical industry, in particular, have continued. Although government stimulus money for the past two years has provided extra funds for university graduate programs that may have allowed the number of grad students and postdocs to increase, the loss of that money this year may jeopardize those increases.

More On This Story

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EMPLOYMENT STATUS

Many 2009 chemistry grads had a hard time finding work

	2002	2003	2004	2005	2006	2007	2008	2009
BACHELOR'S								
Full-time	**36%**	**33%**	**35%**	**36%**	**39%**	**39%**	**40%**	**32%**
Permanent	26	24	25	27	30	27	31	23
Temporary	10	9	10	9	9	12	9	9
Part-time	**7**	**8**	**5**	**5**	**4**	**7**	**5**	**7**
Permanent	1	2	1	1	1	1	1	2
Temporary	6	6	4	4	3	6	4	5
Graduate/ professional school	**47**	**49**	**49**	**47**	**47**	**43**	**41**	**46**
Not employed	**11**	**10**	**11**	**12**	**10**	**11**	**14**	**15**
Seeking	6	7	7	8	6	8	10	12
Not seeking	5	3	4	4	4	3	4	3
MASTER'S								
Full-time	**43**	**47**	**53**	**48**	**50**	**52**	**48**	**43**
Permanent	38	41	48	45	42	46	41	38
Temporary	5	6	5	3	8	6	7	5
Part-time	**3**	**7**	**5**	**10**	**5**	**7**	**6**	**8**
Permanent	1	2	2	1	0	2	1	5
Temporary	2	5	3	9	5	5	5	3
Graduate/ professional school	**47**	**33**	**32**	**30**	**35**	**34**	**35**	**30**
Not employed	**8**	**13**	**11**	**12**	**10**	**7**	**10**	**18**
Seeking	5	10	7	9	6	4	7	15
Not seeking	3	3	4	3	4	3	3	3
PH.D.								
Full-time	**51**	**42**	**39**	**38**	**37**	**43**	**54**	**45**
Permanent	45	37	37	34	33	40	51	40
Temporary	6	5	2	4	4	3	3	5
Part-time	**2**	**3**	**1**	**2**	**2**	**3**	**3**	**3**
Permanent	0	1	0	0	1	1	1	0
Temporary	2	2	1	2	1	2	2	3
Postdoc	**40**	**51**	**52**	**51**	**52**	**46**	**37**	**44**
Not employed	**8**	**5**	**8**	**9**	**9**	**7**	**7**	**9**
Seeking	5	4	5	5	6	5	4	7
Not seeking	3	1	3	4	3	2	3	2

NOTE: Numbers may not add to 100% because of rounding. Data for chemistry graduates only in 2002–07 and for all respondents in 2008–09.

STARTING SALARIES OF INEXPERIENCED CHEMISTRY GRADS

Constant-dollar salaries for Ph.D.s have not returned to previous highs

	B.A./B.S.		M.S.		PH.D.	
$ THOUSANDS	CURRENT	CONSTANT	CURRENT	CONSTANT	CURRENT	CONSTANT
2000	$33.5	$41.7	$41.1	$51.2	$64.5	$80.4
2001	32.2	39.0	43.0	52.1	69.5	84.2
2002	31.0	37.0	45.0	53.7	67.5	80.5
2003	32.0	37.3	44.5	51.9	63.3	73.8
2004	32.5	36.9	43.6	49.5	65.0	73.8
2005	35.0	38.4	45.0	49.4	72.4	79.5
2006	35.0	37.2	47.4	50.4	60.0	63.9
2007	36.7	38.0	48.0	49.7	75.0	77.6
2008	40.0	39.9	54.0	53.8	80.0	79.7
2009	38.0	38.0	60.0	60.0	76.3	76.3

NOTE: Median annual salaries of new graduates with full-time permanent employment and less than 12 months of technical work experience prior to graduation. Current dollars are for the referenced years; constant dollars are 2009 dollars. Data for chemistry graduates only in 2000–07 and for all respondents in 2008–09.

EARLY-CAREER SALARIES BY EXPERIENCE

Starting pay for many graduates with the least work experience went down in 2009

	B.A./B.S.			M.S.			PH.D.		
$ THOUSANDS	2007	2008	2009	2007	2008	2009	2007	2008	2009
Less than 12 months	$36.7	$40.0	$38.0	$48.0	$52.0	$60.0	$75.0	$80.0	$76.3
12 to 36 months	38.6	40.0	41.6	47.0	53.5	45.9	70.0	81.0	82.5
More than 36 months	40.0	45.0	45.0	64.0	58.0	61.4	60.0	77.5	63.5
ALL	$37.5	$40.0	$40.0	$50.0	$52.0	$60.0	$70.0	$80.0	$77.3

NOTE: Median annual salaries of new graduates with full-time permanent employment. Data for chemistry graduates only in 2007 and for all respondents in 2008–09.

DEMOGRAPHICS

Two-thirds of Ph.D. recipients in 2009 are U.S. citizens

	B.A./B.S.	M.S.	PH.D.
GENDER			
Women	55%	48%	39%
Men	45	52	61
RACE			
White	77	62	67
Asian	12	26	24
Black	5	4	5
American Indian	1	1	0
Other	5	7	4
ETHNICITY			
Hispanic	6	6	5
CITIZENSHIP			
U.S. native born	89	65	67
Naturalized	7	6	2
Permanent resident	3	5	5
Temporary visa	1	24	26
MEDIAN AGE (years)	**22**	**27**	**30**

NOTE: Percentages are for all responding graduates.

STARTING SALARIES BY EMPLOYER

Grads employed by the government receive high compensation

$ THOUSANDS	B.A./B.S.	M.S.	PH.D.
Academia	$36.4	id	$50.0
Industry	38.4	60.0	78.0
Government	41.0	id	82.5
ALL	**$38.0**	**$60.0**	**$76.3**

NOTE: Median salaries of responding 2009 graduates with full-time permanent employment and less than 12 months of technical work experience prior to graduation. **id** = insufficient data.

STARTING SALARIES BY GENDER

Women Ph.D. graduates in 2009 started out with higher pay than men

$ THOUSANDS	B.A./B.S.	M.S.	PH.D.
Men	$40.0	$60.0	$75.3
Women	36.5	46.5	78.0
ALL	**$38.0**	**$60.0**	**$76.3**

NOTE: Median salaries of 2009 graduates with full-time permanent employment and less than 12 months of technical work experience prior to graduation.

SALARIES BY PRIMARY WORK FUNCTION

Highest salaries are for development and design

$ THOUSANDS	MEN	WOMEN	ALL
Development/design	$72.0	$62.5	$68.2
Professional services	62.5	43.0	50.0
Management	65.0	45.0	49.0
Production/quality control	43.0	43.8	43.3
Research	53.0	38.1	42.8
Teaching	42.5	40.0	41.6
Other	32.3	31.4	32.0
ALL	**$49.4**	**$40.0**	**$43.4**

NOTE: Median salaries for 2009 bachelor's degree graduates with full-time permanent employment.

ADVANCED STUDIES BY TOPIC

A variety of careers start with a chemistry degree

FIELD OF FURTHER STUDY	B.A./B.S.	M.S.
Chemistry	**32%**	**67%**
Other sciences	**24**	**16**
Pharmacology	9	0
Biochemistry	6	8
Life sciences	5	5
Other/math	4	3
Engineering	**8**	**11**
Chemical/biochemical	6	8
Other	2	3
Health	**28**	**0**
Medicine	24	0
Dentistry	4	0
Other	**8**	**9**
Education	3	3
Law	1	3
Business management	1	0
Other	3	3

NOTE: Percentages are of respondents who are continuing advanced studies full time after earning a bachelor's or master's degree in chemistry in 2009. Numbers may not add to 100% because of rounding.

BACHELOR'S SALARIES BY EMPLOYER SIZE

Bigger firms still pay better

SIZE OF EMPLOYER	MEDIAN SALARY ($ THOUSANDS)
Fewer than 50 employees	$31.5
50–99	32.3
100–499	37.4
500–2,499	40.0
2,500–9,999	40.0
10,000–24,999	40.0
25,000 or more	52.7

NOTE: Median salaries of responding 2009 graduates with full-time permanent employment.

EFFECTIVE JOB SEARCHING

Bachelor's degree holders use electronic job sources the most

	B.A./B.S.	M.S.	PH.D.
Electronic	28%	22%	24%
Placement service	21	28	18
Informal channel	16	39	24
Former job	7	0	4
Employment agency	7	0	0
Sent unsolicited résumé	6	6	0
Faculty adviser	5	6	20
Unsolicited offer	1	0	2
Newspaper ad	1	0	0
Magazine/journal	0	0	4
Other	8	0	5

NOTE: Percentages are for responding 2009 graduates with full-time permanent employment. Numbers may not add to 100% because of rounding.

EVALUATION OF JOB

Advanced degrees seem to increase job satisfaction

	B.A./B.S.		M.S.		PH.D.	
	AGREE	DISAGREE	AGREE	DISAGREE	AGREE	DISAGREE
My job is ...						
Related to my field	74%	21%	88%	9%	92%	5%
Commensurate with my training	72	22	83	15	90	6
Challenging	72	21	84	11	90	4
What I expected when I began my studies					64	21

NOTE: "Agree" is the sum of "agree" and "strongly agree," and "disagree" is the sum of "disagree" and "strongly disagree." There was also a neutral option. The fourth question was not asked of bachelor's or master's graduates.

GRADUATE STUDY

Slightly more men than women elect to do additional study

	B.A./B.S.			M.S.		
	MEN	WOMEN	TOTAL	MEN	WOMEN	TOTAL
Do graduate study	51%	49%	50%	36%	31%	34%
Full-time	47	45	46	33	26	30
Part-time	4	4	4	3	5	4
Do not do graduate study	49	51	50	64	69	66

NOTE: Percentages are for all responding 2009 graduates.

WHERE THE JOBS ARE

Nearly half of all 2009 respondents are employed at universities

	B.A./B.S.	M.S.	PH.D.
Academia	45%	48%	55%
Chemical industry	17	19	15
Pharmaceuticals	5	5	6
Analytical/clinical labs	7	1	4
Research institutions	3	10	3
Other nonmanufacturing	13	6	7
Government	9	10	10
Self-employed	2	1	1

NOTE: Percentages are for responding 2009 graduates with full- or part-time employment. Numbers may not add to 100% because of rounding.

DEGREES BY FIELD

Chemistry departments offer degrees in a range of specialties

	B.A./B.S.	M.S.	PH.D.
CHEMISTRY DEPARTMENT GRADUATES			
Classic chemistry degrees	**53.9%**	**55.1%**	**65.1%**
Analytical	0.8	11.6	17.1
General chemistry	51.2	14.0	2.4
Inorganic	0.2	6.2	6.9
Organic	1.0	12.4	26.9
Physical	0.6	7.0	10.2
Polymer	0.1	3.9	1.6
Other	**46.0**	**44.4**	**34.6**
Biochemistry	26.5	13.2	13.1
Chemical engineering	11.1	20.2	14.7
Medicinal/pharmaceutical	0.6	1.6	1.6
Chemical education	2.9	3.9	0.8
Materials science	0.5	1.6	0.0
Environmental chemistry	0.6	0.0	0.4
Other chemistry	2.6	0.8	1.6
Other	1.2	3.1	2.4

NOTE: Data are for all responding 2009 graduates. Degrees in "Other" category are not considered chemistry degrees by the National Science Foundation. Numbers may not add to 100% because of rounding.

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