

STARTING SALARIES

Tough economy continued to suppress employment, **2011 GRADUATES** found, but median salaries were mostly up

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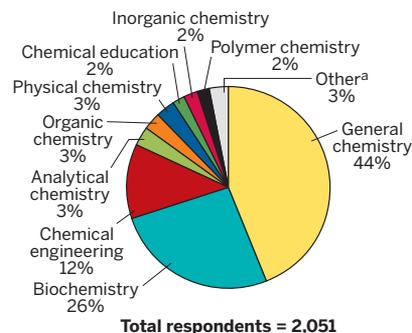
FOR NEW GRADUATES, finding a job can be a challenge in the best of times. But for students graduating in 2011, the gloomy economic conditions made that challenge insurmountable for a record number of chemists and chemical engineers.

In the most recent American Chemical Society survey of new graduates in chemistry and related fields, 13% of respondents were not employed but were actively seeking jobs last year, up from 11% of those who

responded to the 2010 survey. Another 41% of respondents—down slightly from 44% in 2010—opted to pursue additional education or do a postdoc.

For the 35% of new graduates who did find full-time jobs last year, there was some additional good news related to their paychecks—at least for those with a Ph.D. The median salary of inexperienced Ph.D. graduates was \$85,000, a 13% jump from 2010, the first increase since 2008 for this

SURVEY TAKERS Highest degree for most respondents was in general chemistry or biochemistry.



NOTE: Of the respondents, 83% earned new bachelor's degrees, 6% earned master's degrees, and 11% earned Ph.D.s. ^a Includes respondents who selected materials science, environmental chemistry, or medical/pharmaceutical chemistry as field of highest degree, as well as those who opted not to select a field.

EMPLOYMENT STATUS

Employment levels varied while percent not employed hit record

	2005	2006	2007	2008	2009	2010	2011
BACHELOR'S							
Full-time	40%	42%	43%	40%	32%	33%	33%
Permanent	31	34	33	31	23	24	23
Temporary	9	9	10	9	9	9	10
Part-time	4	4	7	5	7	6	8
Permanent	1	1	1	1	2	2	2
Temporary	3	4	5	4	5	5	6
Graduate/professional school	44	44	40	41	46	46	41
Not employed	12	10	11	14	15	15	17
Seeking	8	6	8	10	12	12	14
Not seeking	4	4	3	4	3	4	4
MASTER'S							
Full-time	50	52	54	49	43	47	48
Permanent	45	44	48	41	38	37	38
Temporary	5	8	7	7	5	10	10
Part-time	9	5	6	6	8	7	7
Permanent	2	0	1	1	5	4	3
Temporary	8	4	4	5	3	4	4
Graduate/professional school	30	34	34	35	30	31	22
Not employed	11	9	6	10	18	15	23
Seeking	8	6	3	7	15	11	18
Not seeking	3	4	3	3	3	4	5
PH.D.							
Full-time	44	41	50	53	45	44	38
Permanent	39	37	46	51	40	38	33
Temporary	5	4	3	3	5	7	5
Part-time	2	2	2	2	3	2	4
Permanent	0	1	1	1	0	0	0
Temporary	2	1	2	2	3	1	4
Postdoc	45	49	41	37	44	45	47
Not employed	9	8	7	7	9	9	12
Seeking	6	6	5	4	7	6	9
Not seeking	3	2	2	3	2	3	3

NOTE: Employment status of all respondents as of October each year. Respondents listed by highest degree received. Numbers may not sum to subtotals, or total 100%, because of rounding.

group. The news was not as good for inexperienced master's or bachelor's degree graduates—starting median salaries for master's degree graduates were up 4% in 2011 to \$46,700, and starting salaries for bachelor's degree grads held at \$40,000.

These data come from the annual survey of new graduates conducted by Gareth S. Edwards of the ACS Department of Research & Member Insights under the guidance of the ACS Committee on Economic & Professional Affairs. The survey was sent to graduates in early October 2011, and data were collected until January 2012. More than 11,733 recent graduates were sent surveys, and 2,051 usable responses were returned for a response rate of 17%. The respondents represent many cohorts—degree

BACHELOR'S SALARIES BY EMPLOYER SIZE

Biggest firms were not the highest payers in 2011

SIZE OF EMPLOYER	MEDIAN SALARY (\$ THOUSANDS)
Fewer than 50 employees	\$32.5
50-99	35.0
100-499	37.0
500-2,499	40.0
2,500-9,999	46.0
10,000-24,999	55.0
25,000 or more	49.3

NOTE: Median salaries of responding 2011 bachelor's degree graduates with full-time permanent employment.

STARTING SALARIES OF INEXPERIENCED GRADS

Constant-dollar salaries for Ph.D.s rebounded past recent highs

\$ THOUSANDS	B.A./B.S.		M.S.		PH.D.	
	CURRENT	CONSTANT	CURRENT	CONSTANT	CURRENT	CONSTANT
2005	\$37.0	\$37.0	\$52.0	\$52.0	\$75.0	\$75.0
2006	38.0	36.8	48.8	47.3	66.5	64.4
2007	40.2	37.9	52.0	49.0	77.0	72.5
2008	40.0	36.3	52.0	47.2	80.0	72.6
2009	38.0	34.6	60.0	54.6	76.3	69.4
2010	40.0	35.8	45.0	40.3	75.0	67.2
2011	40.0	34.7	46.7	40.6	85.0	73.8

NOTE: Median annual salaries of responding new graduates with full-time permanent employment and less than 12 months of technical work experience prior to graduation. Constant dollars are 2005 dollars and are calculated using the Consumer Price Index.

SALARIES BY PRIMARY WORK FUNCTION

Salaries for women working in professional services were higher than men's

\$ THOUSANDS	MEN	WOMEN	ALL
Professional services	\$52.5	\$60.0	\$58.5
Development/design	60.0	56.0	56.0
Research	45.8	42.0	45.0
Production/quality control	45.9	38.6	41.0
Management	52.5	30.0	40.0
Teaching	43.5	36.0	40.0
Other	45.0	33.8	40.0
ALL	\$50.0	\$40.0	\$45.0

NOTE: Median salaries for responding 2011 graduates with full-time permanent employment.

level, field of study, gender, experience level, type of employment, and other—and for some groups, the number of respondents is small and thus likely not representative.

OF THE 2011 RESPONDENTS, 83% were newly minted bachelor's degree holders, 6% held new master's degrees, and 11% had just completed a Ph.D. Among the bachelor's degree recipients, the top three fields of study were general chemistry (51%), biochemistry (29%), and chemical engineering (10%). For master's degree holders, 21% earned a general chemistry degree; 18%, a chemical engineering degree; and 13%, an analytical chemistry degree. At the Ph.D. level, 19% earned a chemical engineering degree; 17%, a physical chemistry degree; and 15%, an organic chemistry degree. When all levels are combined, chemical engineering accounted for some 12% of degrees.

New graduates continued to feel the effects of the recession in 2011 as the unemployment rate for all degree levels rose. For bachelor's degree recipients, 14% reported they didn't have a job but were seeking one,

up from 12% in 2010. Nine percent of Ph.D. earners said they were looking for a job in 2011, up from 6% in 2010. But the biggest jump was for those graduating with master's degrees. Those seeking employment in this group grew from 11% in 2010 to 18% in 2011. The increases were essentially the same for both chemists and chemical engineers at each degree level.

The record highs in the unemployment rates for new graduates are consistent with ACS data released

earlier this year regarding the society's overall membership. Those data showed that as of March 1, 2011, more than 4% of members were unemployed, the highest level recorded since ACS began tracking employment in 1972 (C&EN, March 26, page 10). These highs come as the U.S. Bureau of Labor Statistics (BLS) reports that civilian unemployment fell slightly in 2011 to 9% compared with the prior year, and the unemployment level of those more than 25 years old with at least a bachelor's degree was down slightly to about 4%.

The BLS statistics mask the scarcity of full-time jobs for new graduates in chemistry-related fields, particularly for Ph.D.s. Only 38% of all Ph.D. respondents to the ACS new-graduates survey reported being employed full-time in 2011, down from 44% in 2010. The news was much better, however, for one sector within this group: New Ph.D. chemical engineers had a full-time employment rate of 61% in 2011—although this level was down from 67% in 2010.

A third of all new bachelor's degree recipients found full-time positions in 2011,

the same percentage as in 2010. Within this group, chemical engineering bachelor's degree graduates reported having an easier time than chemists in finding full-time jobs, with just more than half of chemical engineering grads having full-time jobs after graduation. This was down from 56% in 2010.

Altogether, chemistry and chemical engineering master's degree recipients were the most likely to have a full-time job after graduating. Nearly 50% of this group—up slightly from 2010—reported being employed full-time.

For those who managed to find a job, the survey data show that median starting salaries in most cases increased or remained steady. Interestingly, the data show a "sweet spot" in the rate of increase from 2010 for those having 12 to 36 months of experience. At all three degree levels, the median starting salary jumped the most from 2010 to 2011 for new grads with this amount of experience.

The median starting salary for bachelor's degree recipients with less than a year of experience held flat in 2011 at \$40,000. For those with more than three years of experience, it dropped nearly 3% from 2010 to

ADVANCED STUDIES BY TOPIC

Chemically trained grads continued studies in a variety of fields

FIELD OF FURTHER STUDY	B.A./B.S.	M.S.
Chemistry	36%	58%
Other sciences	24	15
Pharmacology	10	4
Biochemistry	8	0
Life sciences	2	0
Other/math	4	12
Engineering	6	15
Chemical/biochemical	4	12
Other	2	4
Health	27	8
Medicine	25	8
Dentistry	3	0
Other	7	4
Education	3	0
Law	1	0
Business management	1	0
Other	2	4

NOTE: Percentages are of respondents who were continuing advanced studies full-time after earning a bachelor's or master's degree in a chemical field in 2011. Numbers may not sum to subtotals, or total 100%, because of rounding.

\$39,000 in 2011. But for those with 12 to 36 months of experience, entry pay rose 9% to \$40,259.

In the case of master's degree recipients, median starting salaries for those with less than 12 months, 12 to 36 months, or more than three years of experience were \$46,703 (up 4% from 2010), \$55,300 (up 29%), and \$63,700 (up 18%), respectively.

The most dramatic rate of growth appears for new Ph.D.s, where those with 12 to 36 months of experience reported median starting salaries of \$80,000, up 26% from 2010. Surprisingly, those with less experience pulled in a higher median salary—\$85,000, a 13% increase over 2010—and those with more experience saw a drop of 3% in their median starting salaries, reportedly earning \$84,000.

Median starting salaries for chemical engineers continued to be higher than for those holding nonengineering chemical degrees. The biggest difference shows up in salaries at the bachelor's level. Here, chemical engineers reported earning \$65,000, compared with the \$36,000 starting salary of chemists. Significant differences also exist at the Ph.D. level, with chemical en-

WHERE THE JOBS ARE

Nearly half of respondents were employed in academia

	B.A./B.S.	M.S.	PH.D.
Academia	41%	41%	51%
Chemical industry	20	27	19
Pharmaceuticals	5	10	3
Analytical/clinical labs	7	6	1
Research institutions	3	1	5
Other nonmanufacturing	15	12	8
Government	8	3	13
Self-employed	1	0	0

NOTE: Percentages are for all responding 2011 graduates with full- or part-time employment.

gineers earning \$92,795, whereas chemists earned \$75,000. There were insufficient data for master's degree recipients.

The 2011 data also show a continued divide in median starting salaries for men and women. Of the respondents who had just received a bachelor's degree, women reported earning \$35,430 and men, \$42,000. For women starting out with new Ph.D.s, the median was \$80,230, \$6,770 less than the male respondents. There were insufficient data for those with master's degrees.

Median starting salaries of inexperienced graduates were also affected by the

sector in which respondents found jobs. At the Ph.D. level, jobs in industry were higher paying than those in academia or government, but at the bachelor's level, government jobs commanded a higher median salary. Again, there were insufficient data for those with master's degrees.

Although not the highest-paying sector, academia was the destination for the largest share of graduates, providing jobs for 41% of bachelor's and master's degree recipients and 51% of Ph.D.s. The chemical industry accounted for only about 20% of the bachelor's degree and Ph.D. jobs and

27% of the master's degree positions. To find these jobs, survey data show that electronic media was the most popular resource used by respondents. Placement services and informal channels were the next two most popular job search methods.

IN LIEU OF TAKING A JOB, many bachelor's and master's degree recipients continued their education. Some 41% of bachelor's and 22% of master's degree earners pursued full-time graduate studies. These numbers are down from 2010, when 46% of bachelor's and 31% of master's recipients pursued a higher degree.

For those with bachelor's degrees opting for grad school, the top three fields of future study were chemistry (36%), medicine (25%), and pharmacology (10%). Those with master's degrees selected advanced programs in chemistry (58%), chemical engineering (12%), and other science and math (12%).

Successfully completing advanced degrees seems to correlate with an improvement in respondents' feelings about their jobs. For example, 70% of bachelor's degree recipients felt their jobs were professionally challenging, whereas 84% of master's degree holders and 91% of Ph.D.s felt challenged.

Similarly, when it comes to feeling that their education relates to the field they work in and that their training and education are commensurate with their job, 76% and 73%, respectively, of bachelor's degree earners agreed, but 90% and 81% of master's earners and 93% and 91% of Ph.D. holders agreed.

Although Ph.D.s reported being challenged by and prepared for their jobs, there appears to be a disconnect in understanding exactly what those positions entail, as only 57% of Ph.D. recipients indicated that their jobs were what they expected them to be when they began their studies. ■

CHEMISTS VS. CHEMICAL ENGINEERS

Chemical engineering grads were less likely to pursue further study and tended to be more highly paid than chemists

	B.A./B.S.		M.S.		PH.D.	
	CHEMISTS	CHEMICAL ENGINEERS	CHEMISTS	CHEMICAL ENGINEERS	CHEMISTS	CHEMICAL ENGINEERS
BY EMPLOYMENT						
Full-time	31%	52%	50%	43%	32%	61%
Part-time	9	6	7	5	4	2
Further study	43	25	23	19	51	28
Unemployed	17	17	21	33	12	9
Seeking	14	13	18	19	9	9
Not seeking	4	4	3	14	3	0
BY EMPLOYER						
Academia	44	25	43	29	60	14
Industry	47	72	54	71	29	66
Government	8	2	3	0	12	20
Self-employed	1	1	0	0	0	0
BY GENDER						
Women	55	41	54	14	42	36
BY CITIZENSHIP						
Non-U.S. resident	2	1	8	48	21	18
SALARIES (\$ thousands)						
Full-time permanent	\$36.0	\$65.0	\$51.8	\$77.0	\$75.0	\$92.8

NOTE: Median salary data for all responding 2011 graduates regardless of experience. Numbers may not add to 100% because of rounding.