Starting Salaries of Chemists And Chemical Engineers: 2014

Analysis of the American Chemical Society's Survey Of New Graduates in Chemistry and Chemical Engineering

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Data Based Insights, Inc. on behalf of the
ACS Department of Research & Market Insights

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American Chemical Society

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Available from the Department of Research and Market Insights

ACKNOWLEDGEMENTS

For more than four decades, the American Chemical Society has prepared an annual survey of new graduates. This year, under the direction of the ACS Committee on Economic and Professional Affairs' Subcommittee on Surveys, the ACS conducted a survey to determine trends in starting salaries and the employment status of chemists and chemical engineers. This report presents the detailed results of the 2014 survey of new graduates.

The survey was conducted and managed by Gareth Edwards, Senior Research Associate in the ACS's Department of Research and Market Insights. Andrew Bell of Intelliscan, Inc. directed the data collection. Steve and Clint Marchant of Data Based Insights, Inc. (an affiliate of Intelliscan) analyzed the results of the survey and prepared this report.

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SUMMARY AND COMMENTS

The *Starting Salaries of Chemists and Chemical Engineers: 2014* report examines new graduates from July 2013 to June 2014 and documents the starting salaries for those who obtained a full-time job by the first Monday in October (October 6, 2014). The report discusses median and mean starting salaries, and summarizes how salaries have changed over time. It presents current findings on salary ranges, employment sectors, and salaries between genders. It assesses the proportion of graduates that are going on to advanced studies. It covers employment status, unemployment and job satisfaction.

- The median full-time starting salary for inexperienced new graduates is $42,000. By degree, newly graduated bachelor's earned $40,000, master's $52,000 and PhD's $62,900 (Table 1a).
- The median starting salary for new chemistry graduates with a bachelor's degree improved +2.6% ahead of inflation. However, salaries for new master's and doctorate degree holders lagged behind inflation. (Table 1b).
- Chemical engineering starting salaries for new graduates saw an incremental increase of +1.2% in current dollars from 2013 to 2014 that almost keeps pace with 1.7% inflation (Table 1c).
- Over the past 5 years (2010-2014), the government sector provided new inexperienced chemistry graduates with the highest median starting salary of $41,100, followed by academia at $39,700 and industry at $39,000. A 5 year period was used to increase the sample size for stability. (Table 5b)
- With regard to chemical engineers, the highest and lowest paying sectors for new graduates are reversed. The government is well behind industry and academia in the median salaries it pays for new chemical engineering graduates.
- New female chemistry graduates earned a starting median salary -7.3% less than their male counterparts. Among chemical engineers, new female graduates earned a starting median salary +3.0% higher than their male counterparts. (Table 7)
- Unemployment rates for new graduates declined to 12.4% in 2014, down from 14.9% last year. US government statistics forecast that the trend of lowering unemployment rates to continue through 2015, which indicates that the employment the picture for graduating chemists may further improve. (Figures 4 & 5)

STARTING SALARIES

MEDIAN STARTING SALARIES

Median Salaries for all New Graduates: Newly graduated chemists and chemical engineers with less than 12-months work experience earned a median full-time salary of $42,000 in 2014. Starting salary in 2014 is 1.0% higher than the 2013 median of $41.600. *(Please note: All salary figures are rounded to the nearest $100).*

However, between October 2013 and October 2014, the Consumer Price Index (CPI) rose 1.7%. Median full-time salary for an inexperienced new graduate effectively fell -0.7%, slightly behind the pace of inflation.

The *Constant Dollars* calculations below are based on the CPI, which measures the change in the price of a constant basket of consumer goods and services over time.

Table 1a. Median Full-Time Permanent Starting Salaries for **Inexperienced** New Graduates

(Chemistry & Chemical Engineering Graduates Combined 2013-2014)

	Median Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All New Grads	$41,600	$42,000	+1.0%	-0.7%
Bachelor's	39,600	40,000	+1.0%	-0.7%
Master's	55,000	52,000	-5.5%	-7.1%
Doctorate	75,800	62,900	-17.0%	-18.7%

* Rate of inflation = 1.7%

Table 1a compares median salary from 2013 to 2014 among inexperienced new graduates by degree:

- **Bachelor:** New bachelor's degree holders have similar median incomes from $39,600 in 2013 to $40,000 in 2014.
- **Master:** The change in median salary for new master's degree graduates is a likely function of low response.
- **Doctorate:** Median salary for inexperienced PhD recipients fell to $62,900 in 2014, likely due to low response.

Note: Salary data is based on new graduates as of May-June 2013 and 2014 who had obtained full-time permanent employment by the first week of October the same year.

Median Salaries for Chemistry Graduates: When looking specifically at inexperienced *chemistry* graduates in 2014, median full-time salary increased from $39,600 to $40,000. After the adjustment to constant dollars, the 2014 median salary is -0.7% below the 2013 median salary.

Table 1b. Median Full-Time Starting Salaries for **Inexperienced Chemistry** Graduates (2013-2014)

	Median Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All Chemists	$39,600	$40,000	+1.0%	-0.7%
Bachelor's	35,400	36,900	+4.2%	+2.6%
Master's	55,000	52,000	-5.5%	-7.1%
Doctorate	75,000	60,000	-20.0%	-21.7%

* Rate of inflation = 1.7%

Table 1b reviews comparison salaries for new chemistry graduates between 2013 and 2014:

- **Bachelor:** Starting median salary for inexperienced bachelor's chemistry graduates is $36,900 in 2014, a +4.2% increase over the 2013 median of $35,400. Factoring constant dollar inflation, starting median salary for new bachelors improved by +2.6% in 2014.

- **Masters:** An inexperienced master's degree chemist median starting salary declined -5.5% from $55,000 in 2013 to $52,000 in 2014. After the adjustment for constant dollars, effective median salary declined -7.1%.

- **Doctorate:** New doctorate chemists' median starting salary fell sharply in 2014 to $60,000. Last year, new doctorate chemists started with a median salary of $75,000, a difference of -20.0% -- after adjustment for constant dollars, the effective salary difference is -21.7%.

Median Salaries for Inexperienced Chemical Engineering Graduates: In 2014, inexperienced chemical engineering graduates started with a median salary of $67,800. This starting salary is comparable to the 2013, once factoring constant dollars – an effective difference of -0.5%.

Table 1c shows the net changes by degree:

- **Bachelor:** Chemical engineers receiving bachelor's degrees in 2014 saw a slight loss (-0.8%) in effective starting salary when comparing 2013 and 2014 in constant dollars.
- **Master and Doctorate:** Salary sample sizes for new graduates with *Master's degrees* and *Ph.Ds.* are not shown because they are too small to be reliable.

Table 1c. Median Full-Time Salaries for **Inexperienced Chemical Engineers** 2013-2014

	Median Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All Chem. Engrs.	$67,000	$67,800	+1.2%	-0.5%
Bachelor's	66,700	67,300	+0.9%	-0.8%

* Rate of inflation = 1.7%

MEAN STARTING SALARIES

Mean Starting Salaries for all New Graduates: Mean starting salary for inexperienced new graduates (both chemistry and chemical engineering combined) is $300 less in 2014 ($46,800) than in 2013 ($47,100). Applying an adjustment for constant dollars, the starting salary in 2014 is in effect lower by -2.3%.

Note: Mean salaries tend to be higher than corresponding median salaries, because several graduates including chemical engineers – a smaller group overall -- are able to command significantly higher salaries, which skews the corresponding means higher.

Table 2a. Mean Full-Time Starting Salaries for **Inexperienced** New Graduates
(Chemistry & Chemical Engineering Graduates Combined 2013-2014)

	Mean Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All New Graduates	$47,100	$46,800	-0.6%	-2.3%
Bachelor's	43,200	43,400	+0.5%	-1.2%
Master's	53,400	50,700	-5.1%	-6.7%
Doctorate	71,400	66,700	-6.6%	-8.3%

* Rate of inflation = 1.7%

- **Bachelor:** Inexperienced new bachelor's graduates starting mean salaries were virtually flat from 2013 to 2014 (+$200). The lack of growth translated into a -1.2% effective starting salary in constant dollars.
- **Masters:** Mean starting salary for new inexperienced master's graduates at $50,700 for 2014 is lower by -$2,700 than 2013.
- **Doctorate:** Inexperienced new doctorate graduates had the largest decline in mean starting salary. The starting figure of $66,700 is effectively -8.3% less than last year after the constant dollar calculation of the 2013 mean.

Means for Inexperienced Chemistry Graduates: Overall, the $42,800 mean salary for inexperienced new chemistry graduates in 2014 is the almost the same dollar amount as in 2013 (+$100). However, with an inflation rate of 1.7%, it is effectively a lower salary by 1.4%.

Table 2b. Mean Full-Time Starting Salaries for **Inexperienced Chemistry** Graduates (2013-2014)

	Mean Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All Chemists	42,700	42,800	+0.2%	-1.4%
Bachelor's	37,700	38,200	+1.3%	-0.3%
Master's	52,000	50,700	-2.5%	-4.2%
Doctorate	69,600	66,100	-5.0%	-6.7%

* Rate of inflation = 1.7%

Referring to **Table 2b**, the net changes by degree for chemistry graduates were:

- **Bachelor:** With a 2014 mean starting salary of $38,200, the mean starting salary for inexperienced new bachelor's chemists fell short of keeping pace with inflation.
- **Masters:** New inexperienced master's chemists earned -4.2% less in mean starting salary; from $52,000 in 2013 to $50,700 in 2014.
- **Doctorate:** Mean starting salary declines from $69,600 to $66,100 for new inexperienced doctorate chemists from 2013 to 2014.

Means for Inexperienced Chemical Engineers: Newly graduated inexperienced chemical engineers saw a slight decline to their mean starting salary, from $67,500 in 2013 to $66,900 in 2014. The effective difference is -2.6% in constant dollars.

Table 2c. Mean Full-Time Salaries for **Inexperienced Chemical Engineers** (2013-2014)

	Mean Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All Chem. Engrs.	$67,500	$66,900	-0.9%	-2.6%
Bachelor's	66,100	66,400	+0.5%	-1.2%

* Rate of inflation = 1.7%

Table 2c shows the net changes by degree:

- **Bachelor:** Mean chemical engineering starting salaries for inexperienced new bachelors in 2013 and 2014 are comparable, +$300 in 2014. The difference is only a +0.5% increase in current dollars and -1.2% after constant dollar inflation adjustment.
- **Masters and Doctorate:** Sample sizes for *Master's degree* and *PhD* recipients are too small to be reliable and are not shown.

SALARY INCREASES OVER TIME

Table 3 documents the median starting salaries of inexperienced chemists and chemical engineers in current dollars by degree from 1985 to 2014. Over this period, starting salaries for new inexperienced bachelors have nearly doubled for chemists ($19,500 to $36,900) and more than doubled for chemical engineers ($28,000 to $67,300).

Table 3a. Median Starting Salary for **Inexperienced** Graduates by Degree 1985-2009 ($000)

	Chemists			Chemical Engineers		
Year	B.A./B.S.	M.S.	Ph.D.	B.A./B.S.	M.S.	Ph.D.
1985	19.5	27.0	35.9	28.0	31.4	40.0
1986	18.6	26.1	38.0	28.4	31.0	41.5
1987	20.0	28.0	38.4	30.0	32.5	43.0
1988	21.9	27.7	40.5	31.0	33.0	44.4
1989	23.0	30.3	42.0	33.0	36.0	47.0
1990	23.0	30.0	44.0	35.2	37.2	50.0
1991	23.0	32.0	46.0	37.5	40.2	52.0
1992	24.0	31.5	47.5	40.0	41.5	54.0
1993	24.0	34.0	50.4	40.5	42.2	52.7
1994	24.0	30.8	48.0	n.a.	n.a.	n.a.
1995	25.0	36.0	50.0	40.0	44.2	59.2
1996	25.0	34.1	45.0	41.5	45.0	57.0
1997	28.0	37.5	54.0	42.0	47.0	60.0
1998	29.5	38.5	59.3	45.0	49.8	65.0
1999	30.0	42.0	61.0	47.0	52.0	67.7
2000	34.3	44.1	64.5	49.4	55.0	72.0
2001	32.2	43.0	69.5	51.0	60.0	73.5
2002	31.0	45.0	67.0	50.0	59.0	75.0
2003	32.0	44.5	63.3	52.0	55.0	72.0
2004	32.6	43.3	65.0	52.0	59.3	78.6
2005	35.0	45.0	72.0	54.0	62.2	83.0
2006	35.0	47.4	60.0	55.8	58.0	78.0
2007	37.0	48.0	75.0	58.0	65.5	84.5
2008	35.0	49.8	75.0	63.0	60.0	85.0
2009	33.6	48.5	73.1	66.0	60.0	86.8

Table 3b. Median Starting Salary for **Inexperienced** Graduates by Degree 2010-2014 ($000)

	Chemists			Chemical Engineers		
Year	B.A./B.S.	M.S.	Ph.D.	B.A./B.S.	M.S.	Ph.D.
2010	35.0	45.1	72.0	64.0	n.a.	93.5
2011	35.0	46.7	76.0	62.5	n.a.	100.0
2012	36.0	46.5	74.5	66.8	75.2	93.0
2013	35.4	55.0	75.0	66.7	n.a.	n.a.
2014	36.9	52.0	60.0	67.3	n.a.	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

The gaps between starting levels for each of the 3 *chemistry* degrees have also changed:

- **1985:** The starting median for an M.S. degree in chemistry in 1985 was $27,000 or 39% more than the bachelor's degree median of $19,500. The starting median for a Ph.D. in chemistry was $35,900 or 33% higher than the M.S. degree.
- **2014:** In 2014, the starting median for an M.S. degree in chemistry is $52,000, which is 41% more than the $36,900 median for bachelors. However, the starting median for a chemist with a Ph.D. is $60,000, which is 15% higher than the median for the M.S. degree (and 63% higher than the bachelor's starting wage).
- **Benchmark Highs:** The highest starting median salary for *chemists* with a bachelor's degree was $37,000 in 2007, seven years ago. Median salary high points for chemists with more advanced degrees were within the past three years: $55,000 for a master's degree in 2013, and $76,000 for a Ph.D. in 2011.

Chemical engineers start with higher salaries but the gaps between degrees is not quite so big.

- **1985:** In 1985 the starting median for an M.S. degree in chemical engineering was $31,400, which was just 12% higher than the starting median for bachelors of $28,000. The Ph.D.'s starting median was $40,000 or 27% higher than the M.S. median.
- **2014:** Jumping to 2014, there are an insufficient number of new inexperienced graduate respondents with an M.S. or a Ph.D. to draw conclusions.
- **Benchmark Highs:** 2014 marks the highest starting median salary for new inexperienced *chemical engineers* with a bachelor's degree ($67,300).

In 2007, a major correction to the world and US economies occurred. **Figures 1a & 1b** depict the median salary trends for new inexperienced chemists and chemical engineers in 2007 constant dollars. Since 2007, the effective starting salary eroded among all newly graduated chemists, with a more pronounced declining salary among chemists with a PhD.

Figure 1a: Median Starting Salaries 2007 - 2014 for Inexperienced Chemists Working Full-Time in 2007 Dollars

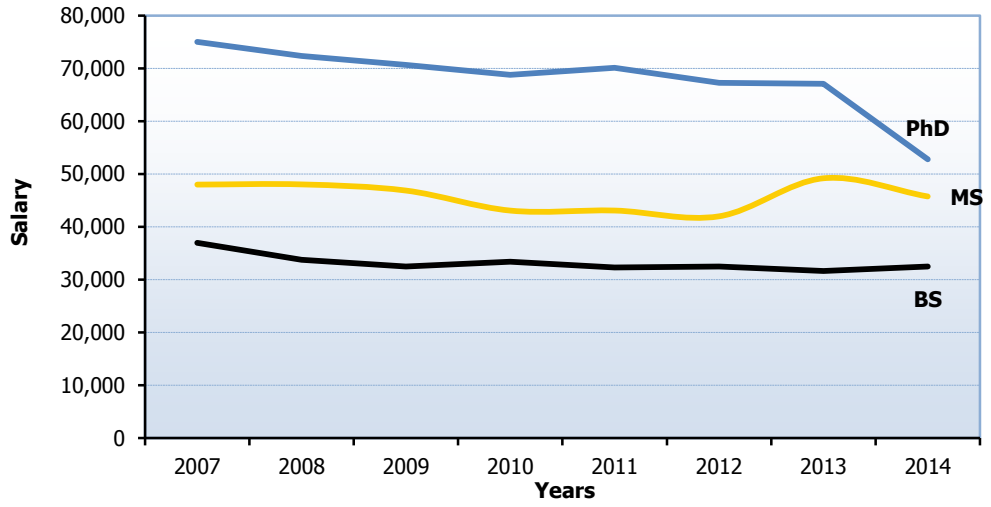
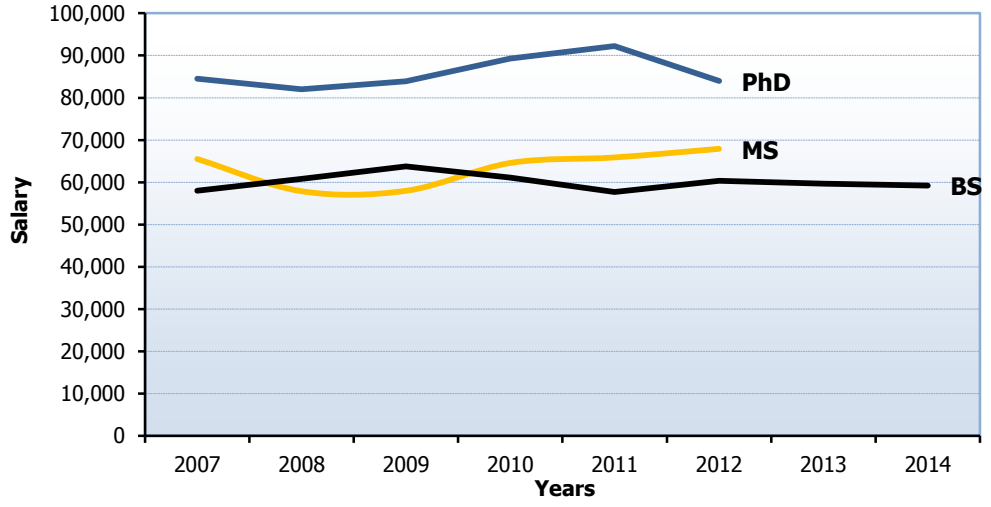


Figure 1b: Median Starting Salaries 2007-2014 for Inexperienced Chemical Engineers Working Full-Time in 2007 Dollars



STARTING SALARIES BY PERCENTILE

Table 4a and 4b break down starting salary ranges for inexperienced full-time permanently employed chemistry and chemical engineering graduates, respectively.

- **Bachelor:** In 2013 and 2014, the top 10% of new graduates with a bachelor's degree earned $53,000 in starting salary. Starting salary for the bottom 10% increased from $25,000 to $26,900. The gulf between top and bottom has decreased from the top earning 112% more in 2013 to 97% more in 2014.
- **Master:** The top 10% of inexperienced chemistry graduates with a master's degree earn a starting salary of $70,000, which is 118% more than the $32,000 for the bottom 10%.
- **Doctorate:** The starting salary range from top 10% to bottom 10% only changed by $500 from 2013 to 2014. However, as previously noted the median starting salary declined -20%.

Table 4a. Ranges of Starting Salaries of **Inexperienced Full-Time** Employed **Chemistry** Graduates by Degree 2012 & 2013

	Bachelor's		Master's		Doctorates	
	2013	2014	2013	2014	2013	2014
90th Percentile	53,000	53,000	65,000	70,000	96,000	96,500
75th Percentile	44,000	45,000	60,000	57,000	83,500	86,000
50th Percentile	35,400	36,900	55,000	52,000	75,000	60,000
25th Percentile	30,000	30,000	45,000	42,500	51,800	50,000
10th Percentile	25,000	26,900	36,000	32,000	42,000	42,000
Mean	37,700	38,200	52,000	50,700	69,600	66,100
Count	259	274	21	17	41	49
Std. Deviation	11,700	10,800	13,800	13,300	19,800	21,300
Std. Error of Mean	728	650	3,004	3,263	3,092	3,039

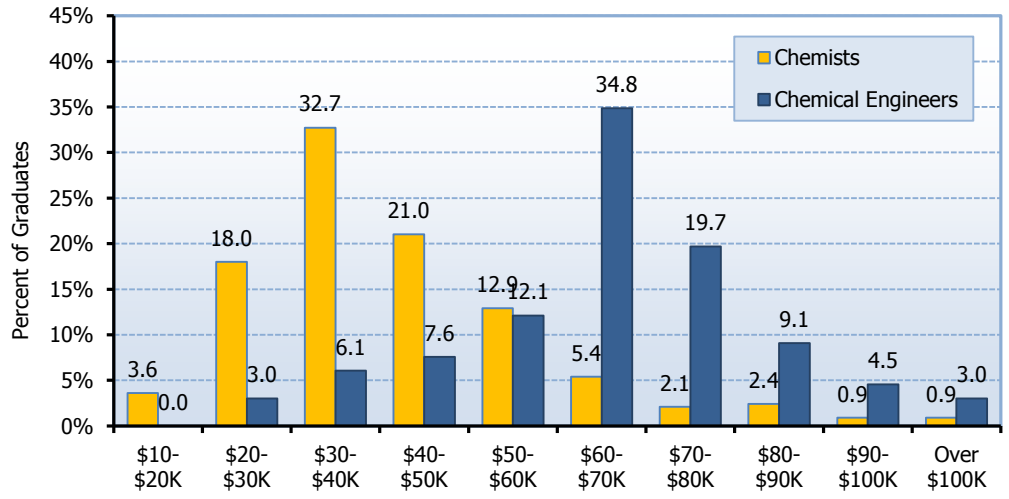
Table 4b: Among inexperienced chemical engineers with new bachelor's degree, the top 10% received salaries exceeding $87,600, or 30% higher than the median of $67,300. Graduates at the low end of the range received salaries at or below $45,000, or at least 33% lower than the median. Data are not robust enough to report for graduates with Master's degrees and Ph.Ds.

Table 4b. Range of Starting Salaries for **Inexperienced Full-Time** Employed **Chemical Engineering** Graduates with Bachelor's Degrees 2013 & 2014

	Bachelor's	
	2013	2014
90th Percentile	85,000	87,600
75th Percentile	72,000	74,900
50th Percentile	66,700	67,300
25th Percentile	60,000	60,000
10th Percentile	53,500	45,000
Mean	66,100	66,400
Count	63	62
Std. Deviation	13,600	16,100
Std. Error of Mean	1,716	2,044

Figure 2 summarizes the difference in starting full-time salary range between inexperienced new chemistry graduates and chemical engineers. 72% of inexperienced new chemistry graduates have starting salary within a range of $20 to $50K. A new chemical engineering graduate typically earns more -- 76% in 2014 earned a starting salary between $50 and $90K.

Figure 2: Percent of Inexperienced New Graduates in Each Starting Salary Range (2014)



SALARIES BY EMPLOYMENT SECTOR

Median Salaries by Employment Sector: Over the past five years (2010-2014), new graduates have taken jobs in the following proportions:

Table 5a. Placement of Inexperienced New Graduates (2010-2014)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	74%	90%
Academia	19%	6%
Government	7%	3%

The combined 2010-2014 data reveal government jobs have paid the highest starting salary for new *chemistry* graduates during the past 5 years, on average. In contrast, industry and academia sectors offer new *chemical engineering* graduates a more competitive starting salary than does the government sector:

Table 5b. Median Salaries for Inexperienced New Graduates (2010-2014)

Sector	Chemistry Graduates	Chemical Engineering Graduates
Industry	39,000	66,600
Academia	39,700	61,000
Government	41,100	55,300

Medians are based on unadjusted current dollar data as collected across the 5 year period.

Table 6 compares starting full-time median salaries for inexperienced new graduates by employment sector for 2013 and 2014. Starting median salary had strong growth, increasing 9.6% in current dollars for those in the academic sector. Salary in the government sector kept pace with inflation and industrial sector salaries declined -2.5% in current dollars.

Table 6. Median Salaries for **All Inexperienced** New Graduates Working **Full-Time Permanent** Jobs by Employment Sector 2013-2014

	Median Salary in Current Dollars		% Change from 2013	
	2013	2014	Current Dollars	Constant Dollars*
All Sectors	41,600	42,000	+1.0%	-0.7%
Industry	43,600	42,500	-2.5%	-4.2%
Government	40,400	41,000	+1.5%	-0.2%
Academia	36,500	40,000	+9.6%	+7.9%

* Rate of inflation = 1.7%

EQUALITY OF THE SEXES

Female new chemistry graduates working full-time earn a median salary of $38,000, or about -7.3% less than their male counterparts. The difference in salary between men and women earning bachelor's degrees (-5.3%) is lower than those earning a doctorate (-7.7%).

On the other hand, new inexperienced female chemical engineers working full-time start with a median salary that is +$2,000 higher than their male counterparts. The difference in salary is about +3.0%.

The sub-samples for inexperienced chemists with master's degrees and chemical engineers with master's degrees and Ph.D.'s are quite small and therefore not shown.

Table 7. Median Starting Salaries for Male and Female **Full-Time Permanent Inexperienced** Chemists and Chemical Engineers by Gender in 2014

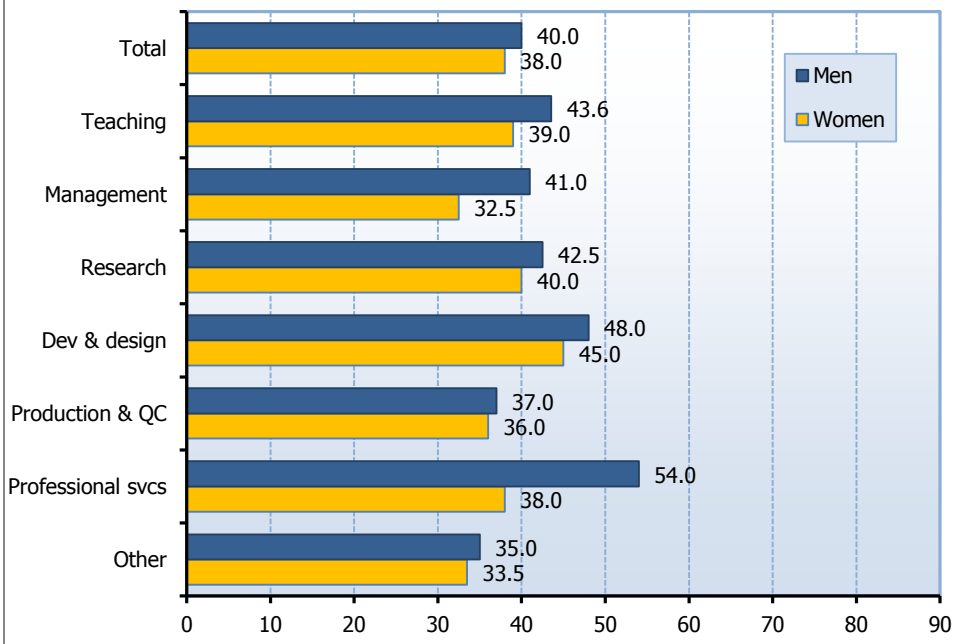
	Chemistry Graduates			Chemical Engineering Graduates		
	Men	Women	Difference	Men	Women	Difference
All Degrees	41,000	38,000	-7.3%	66,500	68,500	+3.0%
Bachelor's	38,000	36,000	-5.3%	66,000	68,000	+3.0%
Master's	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Doctorate	65,000	60,000	-7.7%	n.a.	n.a.	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

Chemists: Figure 3a compares men's and women's median starting salaries for *chemists* with less than 12 months professional or technical work experience by different job types. To obtain a representative sample across a fairly large number of breaks, we have combined data over a five year span (2010-2014) to base the results on a robust sample of 763 women and 694 men.

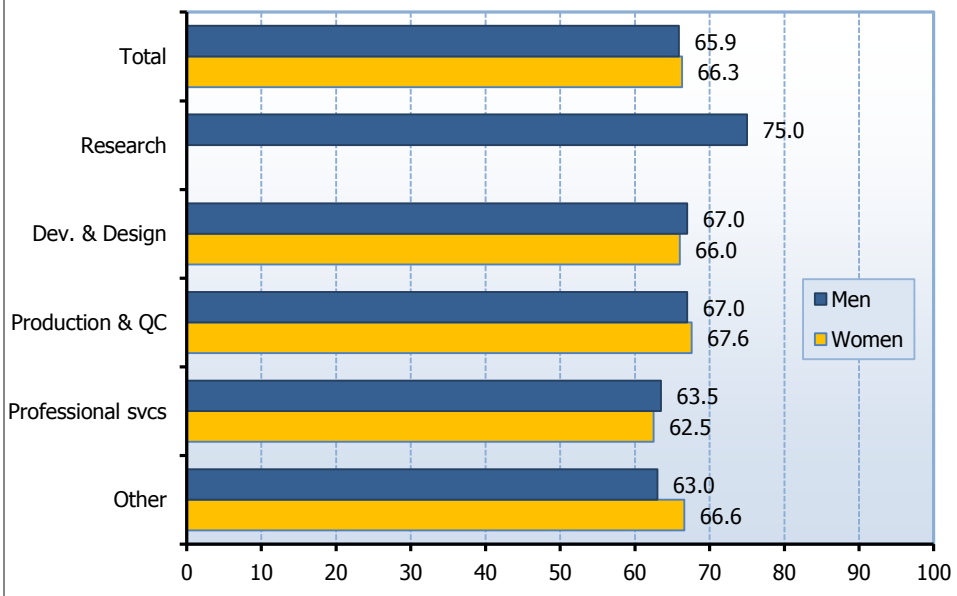
Across all the job categories, among inexperienced chemists over the past 5 years, males receive a median starting salary +$2,000 higher than females. The job categories with the widest gulf in starting salary between men and women are Professional Services (men +$16,000) and Management (men +$8,500). Starting salaries among those in Production and Quality Control have the smallest difference between men and women (men +$1,000).

Figure 3a: Inexperienced Full-Time Chemists' Median Salaries for Males & Females by Job Type (2010-2014)



Chemical Engineers: Among inexperienced chemical engineers, median starting salary data over the past five years shows almost no disparity between men (median $65,900) and women (median $66,300). However, as a reminder, interpret the results with some caution as the samples for chemical engineers tend to be small, even over 5 years of data.

Figure 3b: Inexperienced Full-Time Chemical Engineers'
Median Starting Salaries for Males & Females by Job Type (2010-2014)



Cells with fewer than 15 cases have been omitted from this chart

PLANS FOR ADVANCED STUDY

Table 8: This year, 37.8% of chemistry and chemical engineering graduates are currently pursuing advanced studies as of fall 2014, full-time (34.5%) or part-time (3.3%). Chemistry graduates are about twice as likely as chemical engineering graduates to be enrolled in some form of advanced study. Males (36.0%) are slightly more likely than females (32.8%) to be enrolled full-time.

Table 8. Advanced Studies by Degree Field and Gender (2014)

	Degree Field			Gender		
	Chem. (n = 1,704)	Chem. Engr. (n = 169)	Total (n = 1,873)	Female (n = 927)	Male (n = 899)	Total (n = 1,826)
Enrolled Full-Time	36.2%	17.8%	34.5%	32.8%	36.0%	34.4%
Enrolled Part-Time	3.4%	2.4%	3.3%	2.9%	3.9%	3.4%
Not Enrolled	60.4%	79.9%	62.2%	64.3%	60.1%	62.2%

Among new graduates, the proportion of those seeking post-graduate education has been declining. In 1987, 60.0% of new graduates were enrolled in advanced studies. In 2014, the proportion of new graduates enrolled in advanced studies, either full or part-time, within the year has declined by roughly 1/3 to 37.8%.

Table 9 shows the fields of advanced study that chemistry and chemical engineering B.S./B.A. and M.S. graduates have enrolled in for fall 2014. The table combines full and part-time students and breaks out the fields of study by chemistry and chemical engineering graduates who are continuing their education. Because the sample sizes are fairly thin for reliably covering the list of advanced degree fields of study, the table shows the combined results over 5 years (2010-2014) for enhanced stability. It is important to note that the 5 year results do not differ much from the 2014 solo results, indicating that the data holds together quite well on a year-over-year basis.

Among chemistry graduates in pursuit of an advanced degree, 36.3% pursue further chemistry education and training. Outside of further chemistry education, 17.7% of chemistry graduates study a scientific field (fields 2 through 6 on the list), 37.4% pursue degrees in the medical profession (medicine, dentistry, pharmacy), and the remaining 8.6% study non-scientific professions such as business management, education, law or other endeavors.

Chemical engineers are more strongly focused on advancing their chemical engineering expertise. Based data over the past 5 years, 57.7% pursued advanced study in either chemical or biochemical engineering.

Table 9: Fields of Advanced Study Started in Fall of the Year of Graduation by Chemistry and Chemical Engineering Graduates Across 2010-2014

	Chemistry	Chemical Engineering
	2010-2014 (n = 3,594)	2010-2014 (n = 182)
Chemistry	36.3%	8.8%
Other Physical Science/Math	4.1%	n.a.
Chem/Biochem Engineering	1.3%	57.7%
Other Engineering	1.2%	9.9%
Biochemistry	8.0%	n.a.
Life Science	3.1%	n.a.
Medicine	23.2%	9.3%
Dentistry	3.3%	n.a.
Pharmacy	10.9%	n.a.
Business Management	0.9%	n.a.
Education	2.9%	n.a.
Law	1.1%	n.a.
Other	3.7%	n.a.

Cells with fewer than 15 cases not available and indicated with "n.a."

EMPLOYMENT STATUS

EMPLOYMENT STATUS

Table 10 below brings all employment variables tracked by the new graduate study together in a single summary table for all 2014 graduates:

Table 10. Summary of Employment Status for All New Graduates 2014

Employment Status	Respondent Counts	Percent
Full-Time Permanent	599	29.7%
Full-Time Temporary	195	9.7%
Part-Time Permanent	56	2.8%
Part-Time Temporary	128	6.4%
Graduate Student/Postdoc	706	35.0%
Not Employed/but Seeking	250	12.4%
Not Employed/not Seeking	81	4.0%
TOTAL	2,015	100.0%

UNEMPLOYMENT

Unemployment among new graduates continues to run high, roughly 4 times as high as the rate for regular ACS members in 2014.

Figure 4: Unemployment Rate Among New Graduates Compared with ACS Members 2000-2014

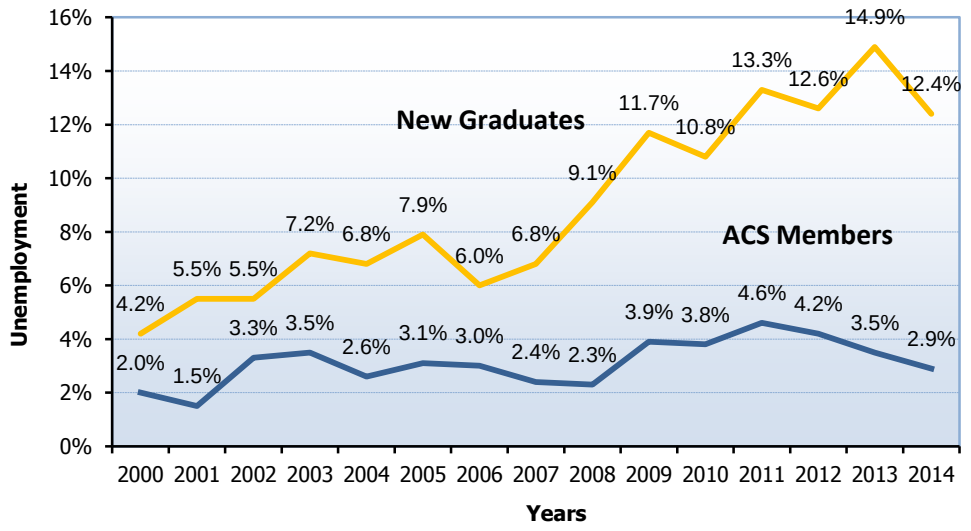
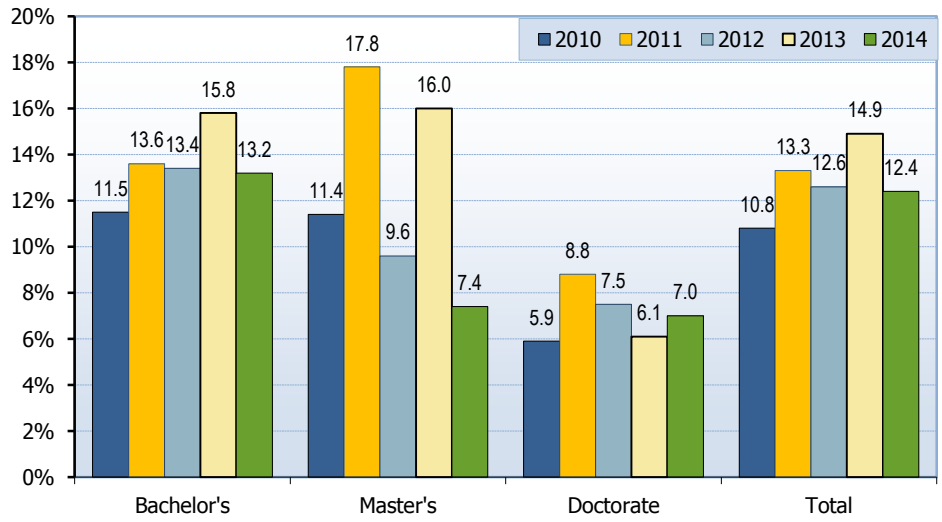


Figure 5 provides comparison of unemployment rates for new graduates by degree from 2010 to 2014. Overall, the employment picture for new chemistry and chemical engineering graduates improves for 2014. However, full-time employment over the past five years (2010-2014) still remains a challenge for new graduates. While the employment outlook in 2014 is better than it had been in 2013 (14.9%), 12.4% of all new chemistry and chemical engineering graduates were unemployed this year.

Figure 5: Unemployment Rates for All New Graduates by Degree

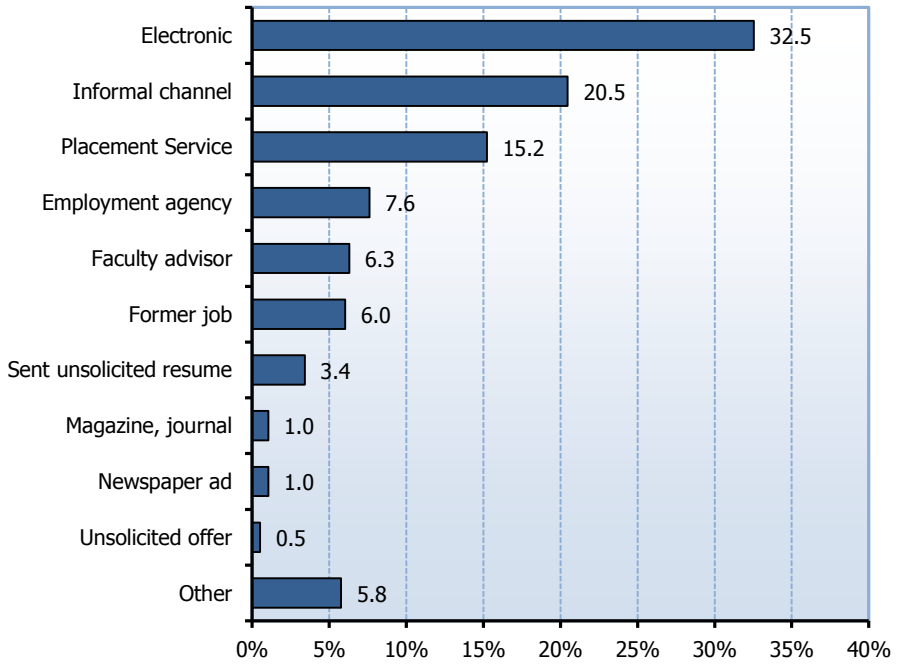


JOB SEARCH

Graduates that found full-time permanent employment by October 1, 2014 were asked to name the "one most effective job search method" they used. The results are shown in **Figure 6.**

In searching for a job, approximately 1 in 3 (32.5%) new graduates indicate that electronic resources were the most effective methods. These resources include Internet search, as well as job posting sites such as Indeed.com and CareerBuilder.com. New graduates also visited specific company websites or networked via sites such as Linked-In. About 1 in 5 (20.5%) found informal channels, such as a colleague or friend, was the most effective method. New graduates rated a placement service as the third most effective (15.2%).

Figure 6: The One Most Effective Job Search Method (2014)



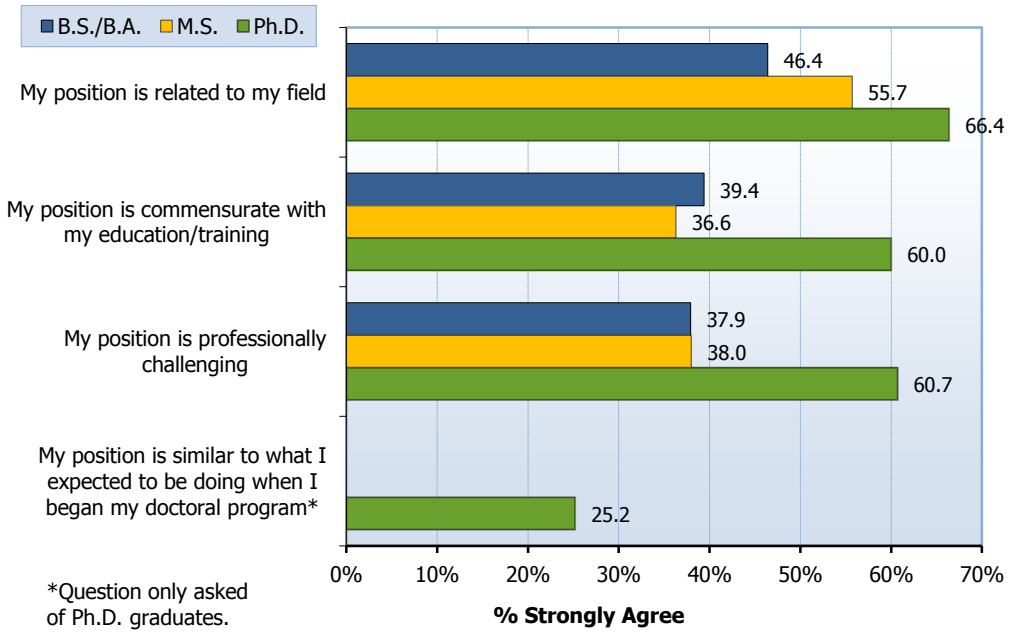
JOB SATISFACTION

Graduates who found full-time permanent employment were also asked a series of questions about how well their educational training prepared them for their job. Three questions were asked (4 for Ph.Ds.) using a scale of *strongly agree, agree, no opinion, disagree* and *strongly disagree.* "Strongly agree" is the most sensitive response and represents the result that university programs are trying to achieve.

Figure 7 shows the "strongly agree" results for chemistry graduates. As one would expect, PhD's are more likely to "strongly agree" that their position is *related to their field, is commensurate with education* and *position is professionally challenging.* PhD's have more specialized knowledge bases that are sought after and they tend to have greater responsibility than those with a bachelor's degree.

The effect of a master's degree does not appear to have the same effect as a doctorate degree on a new graduate's professional role. New master's degree graduates feel about as strongly as new bachelor's degree graduates that their *position is commensurate with education* and their *position is professionally challenging.*

Figure 7: Agreement or Disagreement with Statements Regarding Their Primary Employment (2014)
(% Strongly Agree on a 5-Point Scale)



DEMOGRAPHICS

Table 11. 2014 New Graduate Demographics (n = 2,089)

	Count	Percent
Highest Degree		
Bachelor's	1,823	87.6%
Master's	99	4.8%
Doctorate	159	7.6%
Field of Study		
Chemistry	1,859	89.9%
Chemical Engineering	180	8.7%
Non-Chemistry	30	1.4%
Gender		
Male	989	49.2%
Female	1,021	50.8%
Ethnicity		
American Indian	7	0.4%
Asian	278	14.2%
Black	92	4.7%
White	1,431	73.0%
Multiracial	86	4.4%
Other	67	3.4%
Age		
21 or Under	92	4.6%
22	797	40.2%
23-24	560	28.2%
25-29	350	17.7%
30-34	119	6.0%
35-39	33	1.7%
40-49	29	1.5%
50-64	3	0.2%
65 and Over	0	0.0%

Counts may not total 2,089 because not all respondents answered

Table 11 holds demographics for all new graduates participating in the 2014 ACS survey. It provides a breakout of highest degree earned, field of study, gender, ethnicity and age of all respondents. The majority received a bachelor's degree (87.6%), studied chemistry (89.9%), are White (73.0%) and between the ages of 22 and 29 (86.1%). Gender representation skews slightly female (50.8%).

Table 12 divides the respondents by the degree they received. Among new PhDs, 6.9% are chemical engineers. That is somewhat comparable with new bachelor's and new master's graduates.

The proportion of men and women receiving doctorate degrees are increasingly reflect the population responding to the survey. Newly graduating PhDs skew male – 53.9% of the PhD graduates are male, whereas 49.2% of the survey respondents overall are male.

Asians continue to have a stronger than per capita presence among PhD graduates. Asians were 14.2% of the degree recipients in 2014, but they accounted for 24.0% of the Ph.Ds. awarded. In contrast, Whites account for 73.0% of the graduates in 2014, but account for 65.6% of the PhDs awarded.

Table 12. 2013 Demographics by Degree (n = 2,089)

	Bachelor's	Master's	Doctorate
Field of Study			
Chemistry	89.6%	91.8%	91.2%
Chemical Engineering	8.9%	8.2%	6.9%
Non-Chemistry	1.5%	--	1.9%
Gender			
Male	48.9%	47.3%	53.9%
Female	51.1%	52.7%	46.1%
Ethnicity			
American Indian	0.4%	--	--
Asian	13.1%	17.8%	24.0%
Black	4.4%	11.1%	4.5%
White	74.3%	61.1%	65.6%
Multiracial	4.7%	1.1%	2.6%
Other	3.1%	8.9%	3.2%
Age			
21 or Under	5.2%	1.1%	--
22	45.7%	3.3%	--
23-24	31.4%	15.5%	--
25-29	12.0%	63.3%	53.8%
30-34	3.2%	12.2%	34.0%
35-39	1.0%	3.3%	8.3%
40-49	1.3%	1.1%	3.2%
50-64	0.1%	--	0.6%
65 and Over	--	--	--

CITIZENSHIP

Table 13 examines how many graduates were studying chemistry and chemical engineering in the US on temporary student visas. This will help explain the discrepancy among advanced degree recipients vs. the ethnicity composition of new graduates overall. Again, due to small sample sizes year-to-year and that breakouts are relatively stable, Table 13 is based on a 5 year range of combined data (2010-2014) to improve reliability and stability.

A review of Table 13 reveals that foreign students do not come to the US for an undergraduate degree. Over the last 5 years, only 1.4% of chemistry graduates and 1.6% of chemical engineering graduates were foreigners who came to U.S. universities on a temporary visa to get a B.S./B.A. degree.

Data over the past five years confirms advanced degrees in chemistry and chemical engineering from American universities continue to command very high demand throughout the world. Among chemistry graduates, 16.5% of M.S. degrees and 22.5% of PhDs were awarded to graduates on temporary visas. Similarly, among chemical engineering graduates, 36.2% of master's and 23.1% of doctorate degrees were awarded to foreign students here on temporary visas.

Table 13. Citizenship of Chemistry and Chemical Engineering Graduates (2010-2014)

	Chemistry			Chemical Engineers		
	B.A./B.S. (n = 7,481)	M.S. (n = 532)	Ph.D. (n = 821)	B.A./B.S. (n = 748)	M.S. (n = 58)	Ph.D. (n = 121)
US Native	88.0%	71.6%	67.8%	90.8%	51.7%	71.1%
US Naturalized	7.3%	8.6%	4.1%	5.5%	3.4%	1.7%
US Perm. Resident	3.2%	3.2%	5.5%	2.1%	8.6%	4.1%
Temporary Visa	1.4%	16.5%	22.5%	1.6%	36.2%	23.1%

Caution: Some chemical engineering data are based on small samples and should be interpreted with care.

SCOPE AND METHOD

PURPOSE

The ACS Survey of New Graduates 2014 is part of an ongoing series of annual surveys conducted by the ACS on the employment and future plans of new chemistry and chemical engineering graduates. The primary purpose of the survey is to gather data on the starting salaries and occupational status of new chemists and chemical engineers who graduated during the 2013-2014 academic year. The survey covers bachelors, masters, and doctoral degree recipients.

SAMPLING AND DATA COLLECTION

The ACS Survey of New Graduates 2014 reflects responses from chemistry and chemical engineering college students graduating during the 2013 and 2014 academic year. Chemistry graduates were solicited

from universities containing ACS approved chemistry programs, while chemical engineering graduates were solicited from universities with ABET accredited chemical engineering programs.

Responses were solicited from n graduates having full U.S. mailing addresses, to complete either the paper or online version of the New Graduate Survey in 2014. Of those graduates that had valid addresses, and 2,089 usable responses were received. The ACS Department of Research and Market Insights identified potential participants for this study by requesting the names and addresses of recent graduates from the Office on Professional Training (OPT), an internal department of ACS.

Survey questionnaires were mailed by first class mail in October and November 2014. Two reminder postcards were also mailed. Data collection concluded early January 2015. Of the 12,771 successfully contacted, a total of 2,089 usable responses were received, resulting in a 16.4% response rate. Respondents could complete the survey by mail (n=445) or online (n=1,644). The margin of error at 95% confidence is +/-2.0%.

TECHNICAL NOTES

DISCREPANCIES AMONG TABLES

Because not all individuals responded to all of the survey items, some pairs of tables contain totals that should be identical but are not. For example, one table may group Ph.Ds. by gender and another by employer. The totals will differ unless the number who did not indicate their gender is the same as the number who did not indicate their employer.

ESTIMATES OF MEDIAN SALARIES

Some median salary data presented in salary tables are based on small samples and subject to sampling error. As a precaution, median salary results in all table cells with fewer than 15 respondents are suspect to being unreliable and are not shown in this report. Instead "n.a." has been posted to these data cells and other tabled cells with fewer than 15 respondents.

In some instances this report uses multi-year samples to improve the validity and reliability of the sample data being reported. Nevertheless, caution should be used in interpreting results of any findings based on small samples.