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# Salaries 2013

Analysis of the American Chemical Society's 2013 Comprehensive Salary and Employment Status Survey

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*Prepared by:*

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*Data Based Insights, Inc. on behalf of the  
ACS Department of Research and Member Insights*

August, 2013

**American Chemical Society**

# Salaries 2013

## ANALYSIS OF THE AMERICAN CHEMICAL SOCIETY'S 2013 COMPREHENSIVE SALARY AND EMPLOYMENT STATUS SURVEY

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## ACKNOWLEDGEMENTS

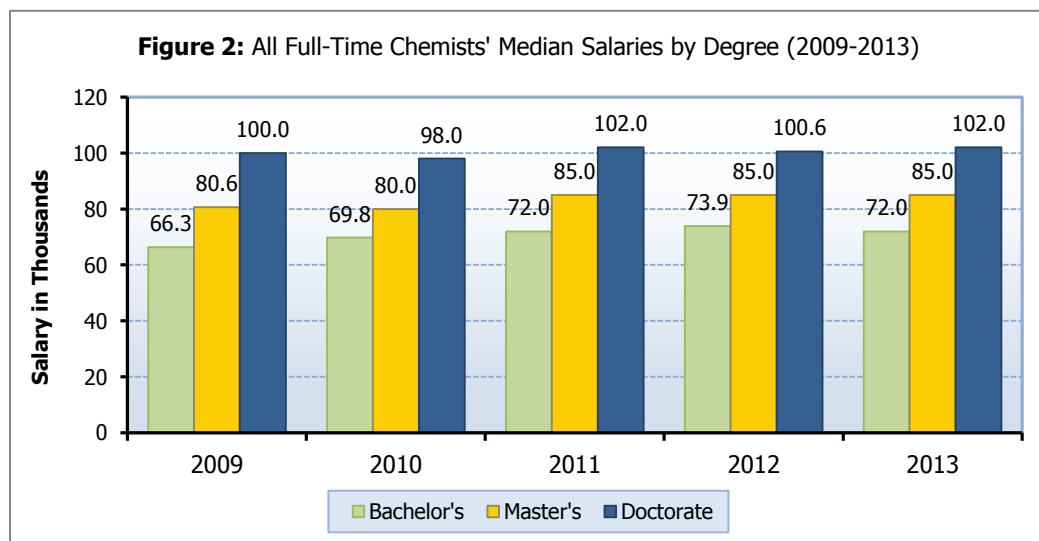
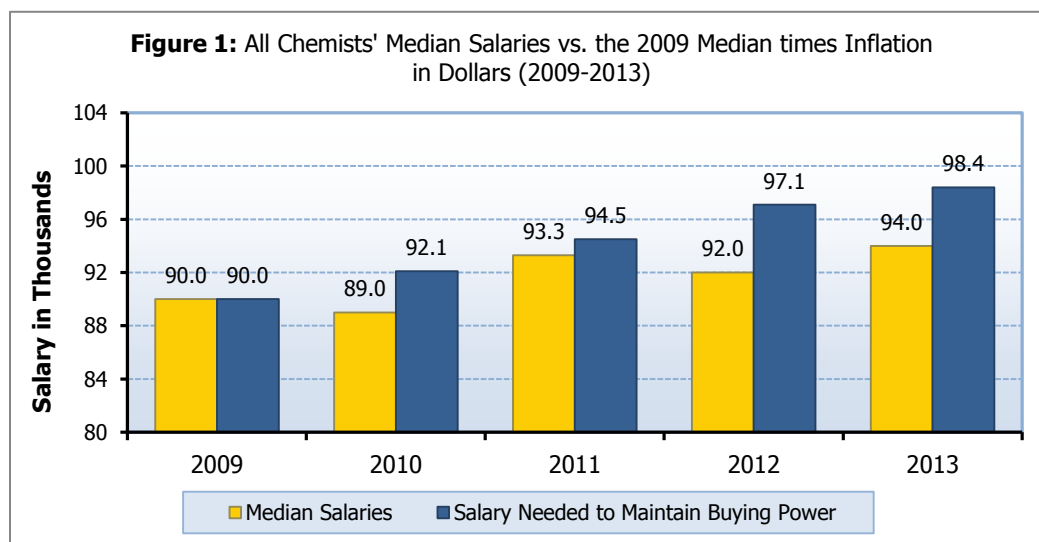
This report presents detailed results of the 2013 ACS Comprehensive Salary and Employment Status Survey. The ACS Committee on Economic and Professional Affairs and its Subcommittee on Surveys planned and provided general oversight of the survey and its analysis. The committee extends its heartfelt appreciation to those who agreed to participate in this survey. The committee would also like to extend its appreciation to the development team. Gareth Edwards, senior research associate in ACS's Department of Research managed the survey. Andrew Bell at Intelliscan, Inc. performed 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.

Gareth Edwards  
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## PERSPECTIVE

Between 2009 and 2013 the median salary of American chemists has risen from \$90,000 in 2009 to \$94,000 in 2013. This is represented in **Figure 1** by the gold colored bars. The dark blue bars indicate the median salary that would be needed to keep pace with inflation and maintain what \$90,000 would have bought in 2009. The equivalent of \$90,000 in 2009 would be \$98,400 in 2013.

**Figure 2** shows that from 2011 to 2013, salary growth remained flat. Median salary in 2013 is the same as 2011: \$72,000 for bachelor's degrees, \$85,000 for master's degrees and \$102,000 for those with a doctorate. Chemist salaries at 0% growth lagged behind inflation, which was 2.7% from 2011 to 2012 and 1.5% from 2012 to 2013.



## SUMMARY AND COMMENTS

The outlook of a chemist's salary in 2013 depended in part on the highest degree attained. The median salary of a chemist with a PhD kept pace with the 1.5% inflation from March 2012 to March 2013, whereas salaries of other chemists did not. At the same time, chemists were moderately more likely to have received a bonus vs. last year, although the size of that bonus decreased. It also appears that stock options continue to lose traction among ACS members as a compensation strategy.

Full-time employment rose to 91.3% in 2013, up from 90.0% in 2012, leading to a second consecutive drop in the rate of unemployed ACS chemists seeking a job to 3.5%. ACS job seekers with bachelor's degrees experienced a better jobs outlook as unemployment fell to 4.6% for chemists with a bachelor's degree (it was 5.9% last year). Unemployment for members with master's degrees was 4.7%, down from 5.4% last year. PhDs continue to have the lowest unemployment rate at 3.0% for 2013 (it was 3.4% in 2012).

Nearly half of all chemists (47.3%) worked with an individual in another country during the past month, with chemists employed in the industry sector (63.9%) the most likely to have done so. Among chemists working with others outside the country, the majority had cited *sharing data or information* (82.4%) or *collaborating on a research project* (57.6%) as part of their work relationship with that person.

## SALARIES

### ALL CHEMISTS

**Table 1.** Change in All Full-Time Chemist's Salaries 2012-2013

|              | Median Salary in Current Dollars |         | % Change from 2012 |                   |
|--------------|----------------------------------|---------|--------------------|-------------------|
|              | 2012                             | 2013    | Current Dollars    | Constant Dollars* |
| All Chemists | 92,200                           | 94,000  | +2.0%              | +0.5%             |
| Bachelor's   | 73,850                           | 72,000  | -2.5%              | -4.0%             |
| Master's     | 85,000                           | 85,000  | 0.0%               | -1.5%             |
| Doctorate    | 100,613                          | 102,000 | +1.4%              | -0.1%             |

\* Rate of inflation from March 2012 to March 2013 = 1.5%

The median salary for all chemists in 2013 increased 2.0% to \$94,000 (from \$92,200 in 2012). Factoring inflation at +1.5%, salary in 2013 kept pace as real buying power based on the median income moved slightly ahead of inflation (+0.5%). Chemists with bachelor's degrees lost the most value in salary from 2012 to 2013 -- the difference in

median income of \$1,850 represents a -4.0% decrease in constant dollars. Salaries among chemists with doctorate degrees kept pace with inflation (-0.1%).

### SALARIES FOR CHEMISTS AND CHEMICAL ENGINEERS

A full-time chemical engineer earns a median salary of \$117,900, an income +25.4% above that of a full-time chemist. The difference in salary between chemical engineers and chemists is greatest amongst those with Bachelor's degrees, +43.3% in favor of chemical engineers and among those age 20-29 at the beginning of their respective careers.

**Table 2.** Median Salaries for Chemists and Chemical Engineers 2013

|                     | Chemists | Chemical Engineers | Percent Difference |
|---------------------|----------|--------------------|--------------------|
| <b>All Chemists</b> | 94,000   | 117,900            | +25.4%             |
| <b>Degree</b>       |          |                    |                    |
| Bachelor's          | 72,000   | 103,155            | +43.3%             |
| Master's            | 85,000   | 111,000            | +30.6%             |
| Doctorate           | 102,000  | 121,965            | +19.6%             |
| <b>Employer</b>     |          |                    |                    |
| Industry            | 106,608  | 120,500            | +13.0%             |
| Government          | 105,242  | 108,000            | +2.6%              |
| Academic            | 74,100   | 108,000            | +45.7%             |
| <b>Age</b>          |          |                    |                    |
| 20-29               | 50,000   | 68,500             | +37.0%             |
| 30-39               | 75,000   | 92,850             | +23.8%             |
| 40-49               | 95,475   | 116,760            | +22.3%             |
| 50-59               | 110,000  | 142,500            | +29.5%             |
| 60-69               | 110,540  | 147,500            | +33.4%             |



**CHEMISTS BY EMPLOYMENT  
SECTOR**

Among the three employment sectors, industry (manufacturing and non-manufacturing), government and academia, the median salaries among chemists in academia saw the highest percent increase from last year, +2.6% using constant dollars (**Table 3**). Meanwhile salaries in the industry and government sectors increased modestly, these increases to median salaries trailed behind inflation.

**Table 3.** Chemists' Median Salaries by Employment Sector 2011-2012

|            | Median Salary in Current Dollars |         | % Change from 2012 |                   |
|------------|----------------------------------|---------|--------------------|-------------------|
|            | 2012                             | 2013    | Current Dollars    | Constant Dollars* |
| Industry   | 106,000                          | 106,600 | +0.6%              | -0.9%             |
| Government | 104,000                          | 105,200 | +1.2%              | -0.3%             |
| Academia   | 71,158                           | 74,100  | +4.1%              | +2.6%             |

\* Rate of inflation from March 2012 to March 2013 = 1.5%

**INDUSTRIAL / PRIVATE  
SECTOR CHEMISTS**

The 2013 median salary of full-time chemists employed in the private sector trailed inflation by -0.9%; however, **Table 4** shows that those with higher degrees fared better.

**Table 4.** Change in Industrial/Private Sector Chemist's Salaries 2012-2013

|              | Median Salary in Current Dollars |         | % Change from 2012 |                   |
|--------------|----------------------------------|---------|--------------------|-------------------|
|              | 2012                             | 2013    | Current Dollars    | Constant Dollars* |
| All Chemists | 106,000                          | 106,600 | +0.6%              | -0.9%             |
| Bachelor's   | 76,300                           | 73,000  | -4.3%              | -5.8%             |
| Master's     | 93,500                           | 94,100  | +0.6%              | -0.9%             |
| Doctorate    | 121,100                          | 125,000 | +3.2%              | +1.7%             |

\* Rate of inflation from March 2012 to March 2013 = 1.5%

Among chemists with Doctorate degrees who are employed in the private sector, median income increased \$3,900 to \$125,000 in current dollars, translating to a +1.7% higher median income in real dollars. At the other end, median salary for private sector chemists with Bachelor's degrees lost -\$3,275 to a median income of \$73,000 in 2013 current dollars. This is an income loss of -5.8% after inflation.

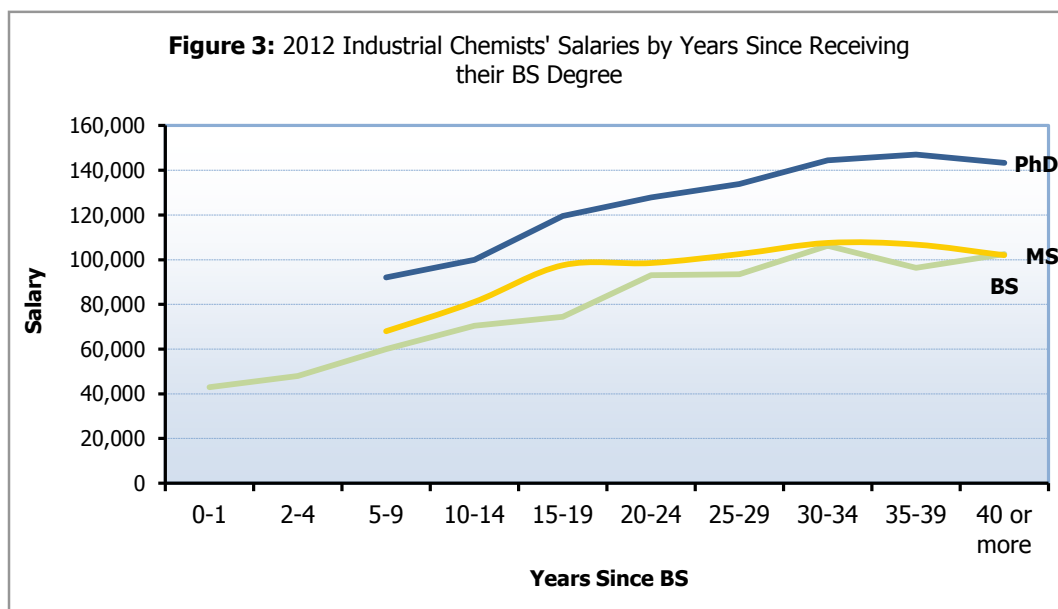
**Table 5** details that the salary gulf between male and female chemists grew larger in 2013. Women earned -18.2% less than men in 2012 and earn -21.1% less than men in 2013.

**Table 5.** Male and Female Full-Time ACS Industrial Chemists' Salaries 2012 & 2013

|             | 2012      |          |            | 2013      |          |            |
|-------------|-----------|----------|------------|-----------|----------|------------|
|             | Men       | Women    | Difference | Men       | Women    | Difference |
| All Degrees | \$110,000 | \$90,000 | -18.2%     | \$114,000 | \$90,000 | -21.1%     |
| Bachelor's  | 80,500    | 65,000   | -19.3%     | 80,000    | 65,000   | -18.8%     |
| Master's    | 98,600    | 85,500   | -13.3%     | 98,000    | 84,000   | -14.3%     |
| Doctorate   | 125,000   | 113,500  | -9.2%      | 130,000   | 110,300  | -15.2%     |

Much of the widening gulf between male and female chemist salaries in the industrial sector overall comes from chemists with Doctorate degrees, where in 2013 women with Doctorates earned -15.1% less than their male counterparts, a larger difference than the -9.2% in 2012. The gulf in 2013 between men and women for chemists with Bachelor's degrees (-18.8%) and Master's degrees (-14.3%) are similar to 2012 levels.

Although median salaries are based on year over year calculations applied to a consistent workforce of chemists between 20 and 70 years of age, most chemists will receive many wage increases over the years as their experience and capabilities grow. **Figure 3** shows how salary increases across the career path of chemists with industrial or private sector jobs. Participants may hold one or more of these degrees. The chart shows how their salaries are likely to track from the date they receive their bachelor's degree.



Starting with the period 5-9 years after receiving a **B.S. degree**, where sample sizes are large enough to be representative of all 3 degree holders, salary growth is quite positive. Industrial chemists with bachelor's degrees may expect salary growth of about 77% from \$60,000 to \$106,000 as they move from 5-9 years of experience to peak earning 30-34 years after earning their degree.

Full-time employees with a **M.S. degree** start with a base salary \$8,000 higher than those whose highest degree is a **B.S.** Chemists with an M.S. degree enjoy a moderately higher salary until about 20 years after first receiving their B.S. degree where the difference in salary narrows. Around 30-34 years, chemists with M.S. degrees earn about as much as those whose highest degree is a B.S., about \$107,500.

**PhDs** start with a base salary of \$92,000 in the 5th to 9th year after graduating with a B.S. degree, a \$32,000 premium over B.S. degree. PhD median salary peaks at \$147,000 (+60%) in 2013 dollars, 35-39 years after receiving a B.S. degree.

**GOVERNMENT CHEMISTS**

According to a line chart in a BLS presentation titled Current Employment Statistics Highlights February 2013 published on March 8, 2013, government employment (federal, state and local) peaked in March 2010, or there about, and has been declining ever since. The overall increase in median salaries for government chemists in 2012 increased +1.2% to \$105,250, which just about keeps up with inflation. Salaries for government chemists with M.S. degrees received a median increase of +11.7% to \$93,550 in 2013. (Some of the 11.7% increase may be due to the volatility in the sample sizes for M.S. degree holding government chemists, which is less than 100 for both 2012 and 2013).

**Table 6.** Change in Full-Time Government Chemist's Salaries 2012-2013

|              | Median Salary in Current Dollars |           | % Change from 2012 |                   |
|--------------|----------------------------------|-----------|--------------------|-------------------|
|              | 2012                             | 2013      | Current Dollars    | Constant Dollars* |
| All Chemists | \$104,000                        | \$105,200 | +1.2%              | -0.3%             |
| Bachelor's   | 74,039                           | 72,000    | -2.8%              | -4.3%             |
| Master's     | --                               | --        | --                 | --                |
| Doctorate    | 112,320                          | 113,400   | +1.0%              | -0.5%             |

\* Rate of inflation from March 2012 to March 2013 = 1.5%

**ACADEMIC CHEMISTS**

Academic chemists in this study refer to:

- Mostly PhDs with a specialty in chemistry,
- who are either full professors, associate professors, or assistant professors,
- who work at a college or university (excluding medical schools)
- and, have either a 9-10 month or an 11 to 12 month contract.

**Table 7** displays the median salaries of academic chemists by faculty rank and length of contract.

**Table 7.** Change in Academic Chemist’s Salaries 2012-2013 (by rank/contract length)

|                                | Median Salary in Current Dollars |           | % Change from 2012 |                   |
|--------------------------------|----------------------------------|-----------|--------------------|-------------------|
|                                | 2012                             | 2013      | Current Dollars    | Constant Dollars* |
| Full Professors -- 9/10 mos.   | \$97,000                         | \$100,000 | +3.1%              | +1.6%             |
| Full Professors -- 11/12 mos.  | 130,000                          | 136,000   | +4.6%              | +3.1%             |
| Associate Profs. -- 9/10 mos.  | 70,000                           | 70,500    | +0.7%              | -0.8%             |
| Associate Profs. -- 11/12 mos. | 75,000                           | 88,000    | +17.3%             | +15.9%            |
| Assistant Profs. -- 9/10 mos.  | 60,000                           | 62,150    | +3.6%              | +2.1%             |
| Assistant Profs. -- 11/12 mos. | 66,500                           | 71,000    | +6.8%              | +5.3%             |

\* Rate of inflation from March 2012 to March 2013 = 1.5%

Academic chemists’ salaries tended to have increased modestly from 2008 through 2012 as many people out of work due to the recession took advantage of the opportunity to head back to school and get a more advanced degree. According to the BLS, employment opportunities at for-profit institutions are expected to grow through 2020. However, public colleges and universities subject to government budgets and deficits are likely to see some lay-offs.

Because median salary results for chemistry professors with 11 to 12 month contracts are based on samples of fewer than 100 respondents, their trend data is too volatile to comment on with confidence.

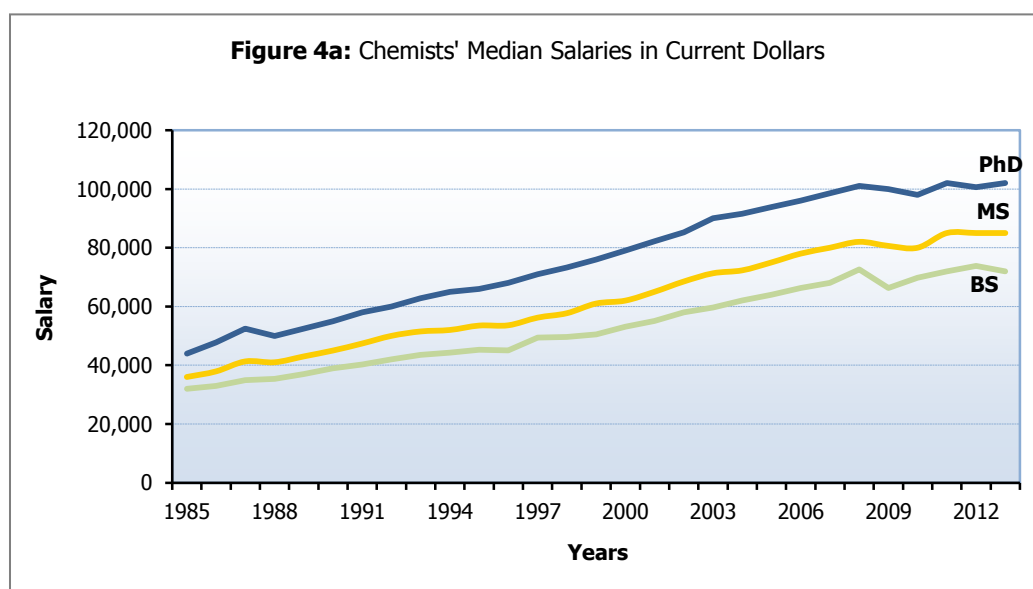
Median salaries for academics on 9-10 month contracts are based on larger, more stable samples. For example, full professors with 9 to 10 month contracts had a median salary of \$94,344 in 2009, which dipped to \$92,878 in 2010, but quickly rebounded to \$96,750 in 2011 and to \$100,000 in 2013. Associate Professors on 9-10 month contracts had a median salary of \$65,376 in 2009, which declined slightly to \$65,000 in 2010 before increasing to \$68,618 in 2011 and \$70,500 in 2013.

**OTHER FACTORS  
INFLUENCING SALARY**

Although the level of education, employment sector, and length of experience may be the most influential correlates of salary, there are a variety of other factors that one should also consider. Some other factors influencing salary are type of work, work specialty, geographic region, and gender.

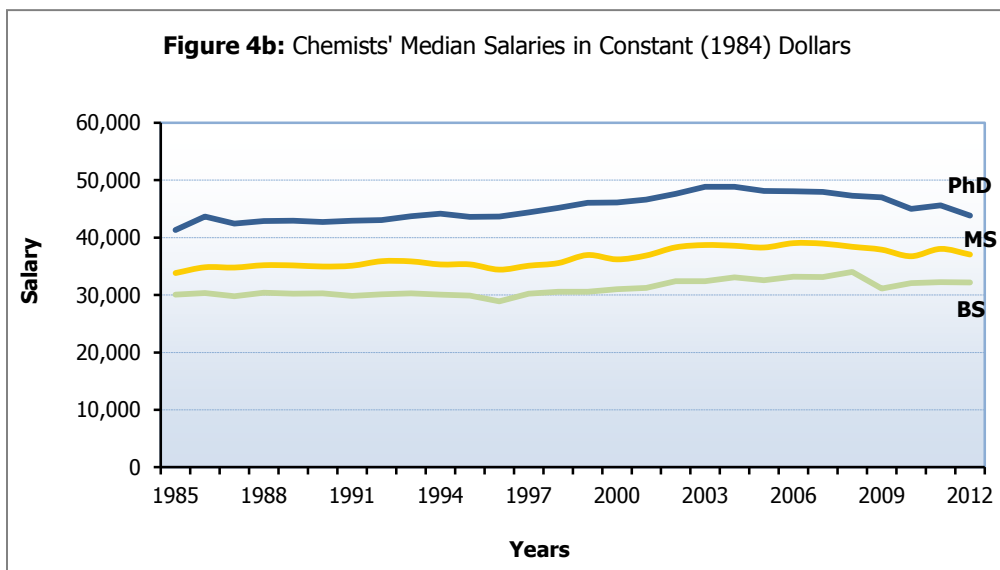
**TRENDS IN CHEMISTS'  
SALARIES**

Chemist median salaries have increased by varying degrees from year to year since the ACS survey and analyses began in 1985. **Figure 4a** displays the trend in chemists' salaries each year by highest degree held in current paycheck dollars. Over the last 28 years, chemists' salaries by this measure have more than doubled.



Chemist's salaries have grown about 5% per year on average from 1985 through 2008. However, due to the international recession that began in 2007, chemist's salaries dipped in 2009 and 2010, but rebounded back to about 2008 levels in 2011 and 2012. The rebound was a good sign that salaries were no longer in decline, but rather than signaling a return to growth, salaries have been flat from 2011 to 2013.

**Figure 4a** depicts a growing divergence in the salaries for different degree holders. **Figure 4b** brings that divergence back to reality by showing that the buying power of salaries in constant 1984 dollars has not changed much at all across the years.



By converting salaries to constant 1984 dollars, the average salaries for chemists (or anyone else) have hardly moved in terms of what you can buy for your money as measured by the Consumer Price Index (CPI). In 1985 the median salary for a chemist with a bachelor's degree was \$30,075. In constant 1984 dollars, the median salary for chemists with a B.S degree 28 years later in 2013 had grown to \$30,931 -- an increase in real terms of \$31 per year, on average. The median salary for a chemist with a master's degree went from \$33,835 in 1985 to \$36,516 in 2013, or an increase in real value of \$96 per year, on average. For PhD's the increase went from \$41,353 in 1985 to \$43,820 in 2013, or \$88 in real buying power per year on average.

Keep in mind that the *median* represents the salary in the middle of the range. Most chemists reading this who were working in 1985 were probably just starting out and were most likely making a salary in the bottom quartile. Today, those same chemists are likely to be making salaries in the top quartile and they have accumulated a substantial gain in buying power even in 1984 constant dollar terms.

## NON-SALARY INCOME

Salaries alone do not provide the total picture of the earning potential for chemists. This section examines additional income, such as consulting, bonuses, and company stock options received by chemists. That is, some chemists earn additional money by engaging in consulting work outside of their primary employment. Meanwhile, there are a substantial number of employers providing yearly bonuses and/or company stock options in order to supplement their chemists' salaries.

### CONSULTING

In 2013, approximately 12.3% of ACS members say they did consulting work in 2012. Median income from consults in 2012 holds steady at \$5,000.

**Table 8.** Consulting by ACS Chemists (Amounts received in 2012)

|                    | % Any Consulting | Median Hourly Rate | Median Income |
|--------------------|------------------|--------------------|---------------|
| <b>All Members</b> | 12.3%            | \$115              | \$5,000       |
| <b>Degree</b>      |                  |                    |               |
| Bachelor's         | 5.0%             | \$100              | \$7,000       |
| Master's           | 7.1%             | \$88               | \$8,500       |
| PhDs               | 15.0%            | \$125              | \$4,900       |
| <b>Employer</b>    |                  |                    |               |
| Industry           | 5.3%             | \$125              | \$7,000       |
| Government         | 3.7%             | \$100              | \$2,000       |
| Academia           | 20.6%            | \$100              | \$3,000       |
| <b>Gender</b>      |                  |                    |               |
| Male               | 13.3%            | \$125              | \$5,000       |
| Female             | 9.8%             | \$100              | \$2,150       |
| <b>Age</b>         |                  |                    |               |
| 20-29              | 3.1%             | \$67               | \$3,500       |
| 30-39              | 9.0%             | \$75               | \$2,000       |
| 40-49              | 11.0%            | \$100              | \$2,500       |
| 50-59              | 14.6%            | \$150              | \$5,000       |
| 60-69              | 19.5%            | \$150              | \$10,000      |

Approximately 15.0% of PhDs do consulting, which is higher than chemists with a master's degree (7.1%) or bachelor's degree (5.0%). PhDs command the highest hourly rate, a median of \$125, earning \$4,900 in 2012, a median consulting income below chemists with a Masters (\$8,500) or a Bachelors (\$7,000) degree.

Academic chemists employed by a college or university did consulting work in 2012 at a rate of 20.6% and earned a median of \$3,000. Chemists employed by the government were the least likely to do any consulting (3.7%).

Chemists consulting income increases over time as their expertise, network and contacts expand. A chemist in their 20s earns \$67 an hour and earns a median income of \$3,500 from consulting, though only 3.1% do any

consulting. A chemist in their 50s earns approximately \$150 an hour with a median consulting income of \$5,000. As members reach their 60s, 19.5% engage clients as a consultant earning a median consulting income of \$10,000.



**BONUSES**

In 2013, 47.9% of all chemists reported that they were eligible to receive a bonus in 2012. Among those eligible for a bonus in 2012, 95.2% received one with a median value of \$9,000, approximately

\$1,000 less than last year. Degree, employment sector, age and gender are all factors in bonus amounts a chemist receives.

**Table 9. Chemist Only Bonuses in 2013 (Amounts received in 2012)**

|                     | % Eligible for Bonus | % of Eligible Receiving Bonus | Median Bonus |
|---------------------|----------------------|-------------------------------|--------------|
| <b>All Chemists</b> | 47.9%                | 95.2%                         | \$9,000      |
| <b>Degree</b>       |                      |                               |              |
| Bachelor's          | 63.6%                | 95.6%                         | \$5,000      |
| Master's            | 57.2%                | 96.7%                         | \$7,980      |
| PhD                 | 42.4%                | 94.6%                         | \$11,500     |
| <b>Employer</b>     |                      |                               |              |
| Industry            | 76.6%                | 95.4%                         | \$10,000     |
| Government          | 43.4%                | 93.2%                         | \$1,650      |
| Academia            | 11.2%                | 94.4%                         | \$2,500      |
| <b>Gender</b>       |                      |                               |              |
| Male                | 50.6%                | 94.8%                         | \$10,000     |
| Female              | 41.5%                | 96.3%                         | \$6,000      |
| <b>Age</b>          |                      |                               |              |
| 20-29               | 44.4%                | 94.4%                         | \$2,000      |
| 30-39               | 42.2%                | 94.6%                         | \$6,000      |
| 40-49               | 50.2%                | 96.2%                         | \$10,000     |
| 50-59               | 52.2%                | 95.1%                         | \$13,000     |
| 60-69               | 45.8%                | 94.7%                         | \$12,000     |

Bonus eligibility was higher among chemists with bachelor's degrees (63.6%) than those holding a masters (57.2%) or PhD (42.4%). The rate for being eligible for a bonus for each degree status is higher by roughly 2-percentage points.

The bonus received in 2012 for bachelors and PhD recipients is lower than in 2011. For amounts received in 2012, bachelors recipients a median bonus of \$5,000, an amount 16% below the amount received in 2011 median of \$5,950. PhD bonuses contracted by a similar percentage, \$11,500 for 2012 amount received vs. \$13,700 for the 2011 amount received. The bonus values for 2012 and 2011 are virtually the same for masters recipients.

**Note:** This year's respondents were asked for previous year's bonuses.

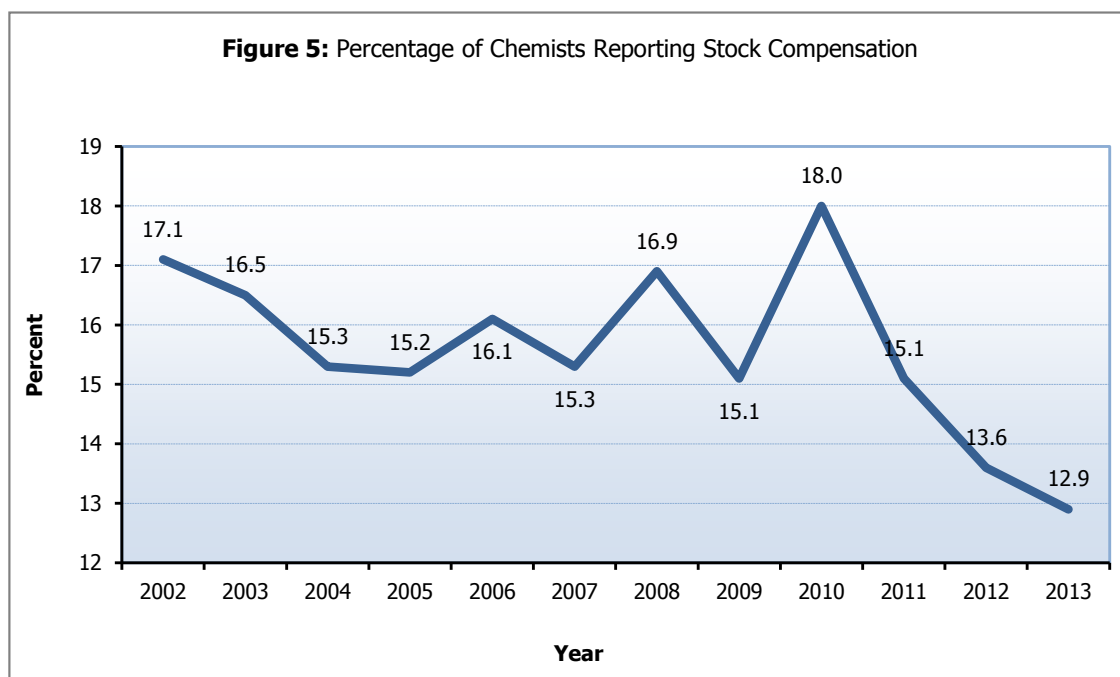
Bonus structures for each employment sector appears to follow the same pattern as the All Chemists average, a small increase in the percent eligible to receive a bonus and a modest decline in the median value. Among the private sector, where bonuses are a customary part of overall compensation packages, eligibility for a bonus in 2012 was at 76.6% (72.8% for 2011) and the median bonus was \$10,000 (\$11,000 for 2011).

Male chemists were more likely than female chemists to be eligible for a bonus (50.6% vs. 41.5%). The discrepancy is in part a factor of employment sector. Male chemists are more likely to be employed in the industrial sector (56.9%) than a female chemist (48.8%), where bonus structures are more customary than in government or academic sectors where the majority of women are hired.

Age and experience factor as expected in determining bonuses. As the chemist's age or experience increased, the amount awarded rose. Chemists in their 20s reported 44.4% eligibility and earned a median value of \$2,000 (37.0% and \$3,000 in 2011). Chemists in their fifties reported the highest median bonus value of \$13,000. After age 59, eligibility (45.8%) and amount (\$12,000) taper off.

**STOCK AS PART OF PROFESSIONAL INCOME**

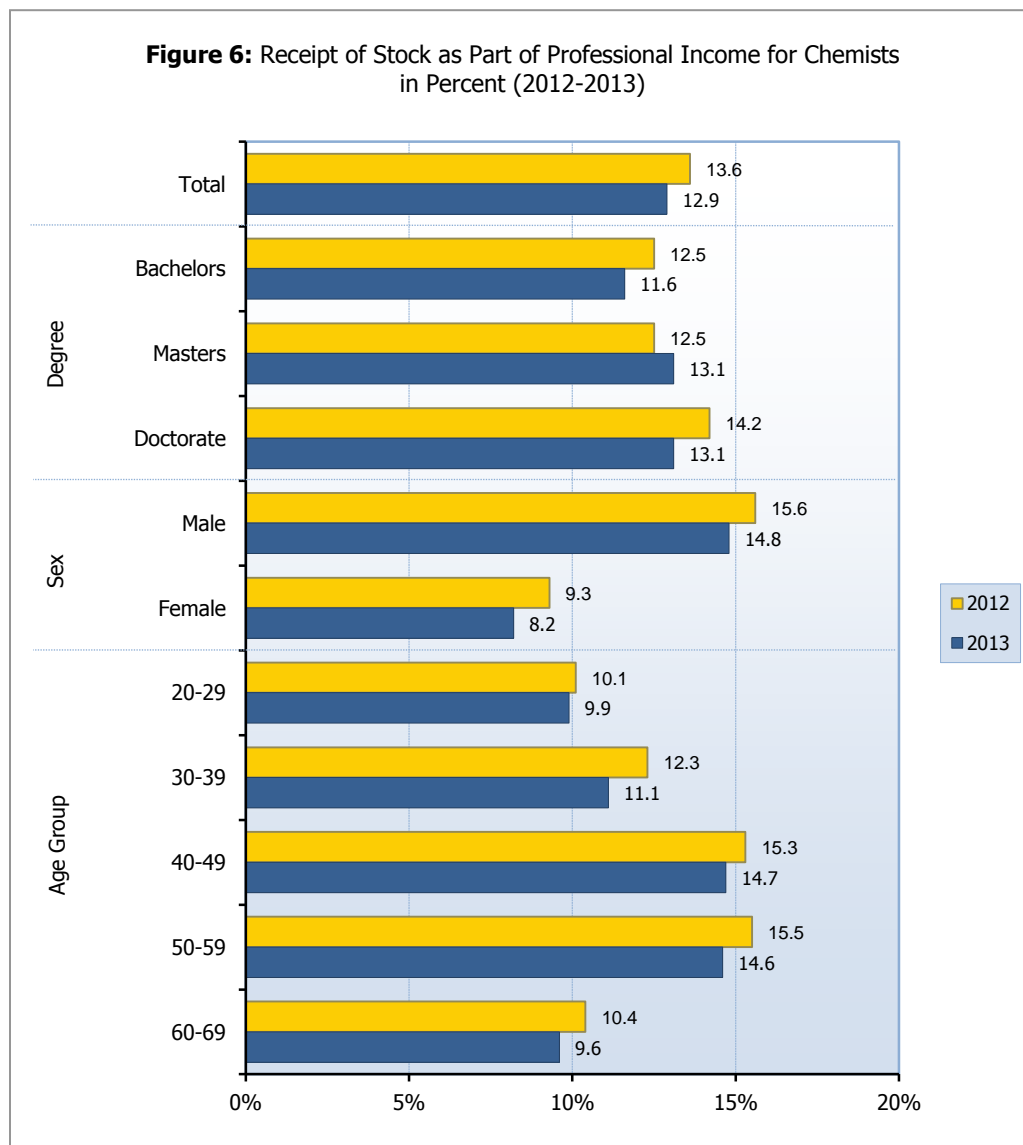
Another way for employers to compensate their employees is by offering them company stock. Since the 2002 survey, when ACS began asking members to report on stock options, the percentage of chemists reporting this type of compensation is shown in **Figure 5**. From 2002 to 2011, the proportion of ACS members whose professional income included stock options kept within a range of 15.1% to 18.0%. Since the 18.0% peak in 2010, the percent of chemists reporting stock as part of their income has fallen to 12.9% in 2013.



Given that stock as part of professional income has declined three consecutive years from 18.0% in 2010, to 15.1%, to 13.6% to 12.9% in 2013, there is an apparent shift away from company stock as a part of compensation packages. The combination of stock market volatility and slow economic growth may have led some companies to use other compensation strategies that may be more appealing in the more recent economic climate.

**Figure 6** shows the percentage of chemists who received stock options in 2011 for 2012 and in 2012 for 2013 by highest degree, sector of employment, gender and age group. Doctorate and master's recipients (both 13.1%) were slightly more likely to receive stock options as part of their overall compensation in 2013 compared to holders of bachelor's degrees (11.6%). Those chemists working in the private sector for industrial manufacturing companies were the most likely group to

receive stock options (24.0% in 2013). In contrast, their counterparts in government (1.4%) and academia (0.9%) were not very likely to receive stock as a method of compensation.



## EMPLOYMENT AND UNEMPLOYMENT

### EMPLOYMENT STATUS

Full-time employment among ACS members typically hovers below 90% (see **Table 10**). After a dip in full-time employment in 2010 (84.3%), the full-time employment rate has improved each year to 89.4% for 2013. This translates to an overall unemployment rate among ACS members of 3.5%, excluding those who are not seeking a job or are fully retired.

**Table 10a.** Unemployment Status of Chemists (Percentages by Year)

|                        | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|------------------------|------|------|------|------|------|------|------|------|------|
| Full Time              | 89.4 | 90.5 | 89.8 | 89.4 | 88.7 | 91.8 | 88.3 | 87.9 | 86.7 |
| Part Time              | 2.7  | 2.1  | 2.4  | 2.6  | 2.9  | 2.4  | 2.8  | 2.9  | 3.4  |
| Post Doc               | 2.7  | 2.3  | 2.2  | 2.0  | 2.0  | 1.3  | 1.4  | 1.3  | 1.8  |
| <b>Not Employed</b>    |      |      |      |      |      |      |      |      |      |
| Seeking                | 2.9  | 1.9  | 2.3  | 2.2  | 2.9  | 1.5  | 3.1  | 3.3  | 3.4  |
| Not Seeking            | 2.3  | 0.8  | 0.9  | 1.3  | 1.7  | 1.4  | 1.5  | 1.7  | 1.4  |
| Fully Retired*         | --   | 2.3  | 2.4  | 2.5  | 2.8  | 1.6  | 2.8  | 2.9  | 3.2  |
| Overall Unemployment** | 3.0  | 2.0  | 2.3  | 2.3  | 3.0  | 1.5  | 3.3  | 3.5  | 3.6  |

**Table 10b.** Unemployment Status of Chemists (Percentage by Year -- Continued)

|                        | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|------------------------|------|------|------|------|------|------|------|------|------|
| Full Time              | 86.0 | 86.9 | 87.4 | 86.9 | 87.7 | 84.3 | 86.9 | 87.4 | 89.4 |
| Part Time              | 3.9  | 3.3  | 3.4  | 3.6  | 3.1  | 3.7  | 3.7  | 3.1  | 2.7  |
| Post Doc               | 1.9  | 2.2  | 1.6  | 1.2  | 2.5  | 3.8  | 1.7  | 2.6  | 2.4  |
| <b>Not Employed</b>    |      |      |      |      |      |      |      |      |      |
| Seeking                | 2.9  | 2.9  | 2.3  | 2.2  | 3.8  | 3.6  | 4.4  | 4.0  | 3.4  |
| Not Seeking            | 1.9  | 1.7  | 1.7  | 1.5  | 1.0  | 2.0  | 1.3  | 1.1  | 0.8  |
| Fully Retired*         | 3.4  | 2.7  | 3.6  | 4.6  | 1.9  | 2.6  | 2.0  | 1.7  | 1.2  |
| Overall Unemployment** | 3.1  | 3.0  | 2.4  | 2.3  | 4.0  | 3.8  | 4.6  | 4.2  | 3.5  |

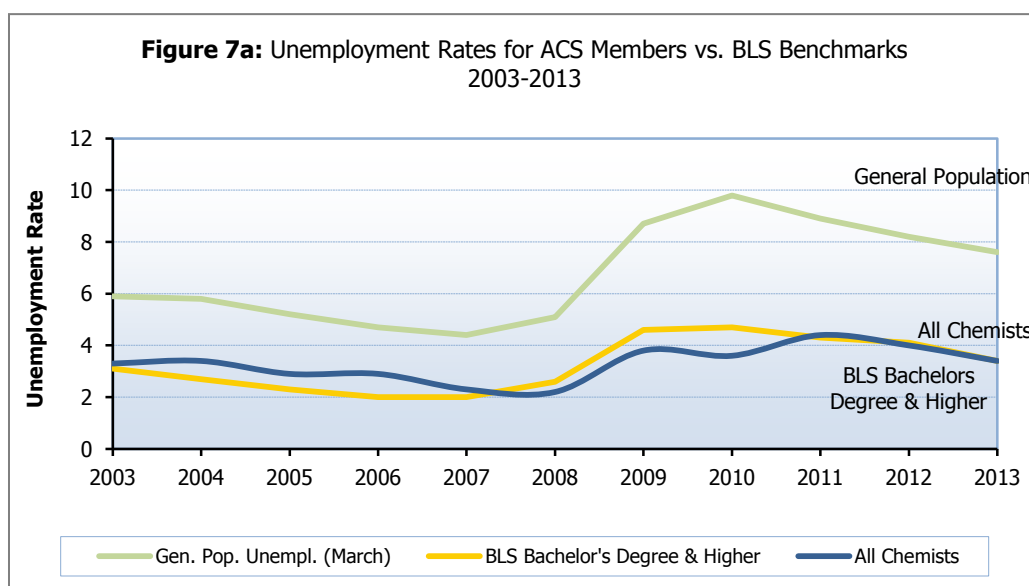
\* Note: Retirement status was added in 1997

\*\* Note: Unemployment rate measures a status of the active workforce. Thus, "not seeking" and "fully retired" populations are dropped from the calculation of the unemployment rate.

**UNEMPLOYMENT STATUS**

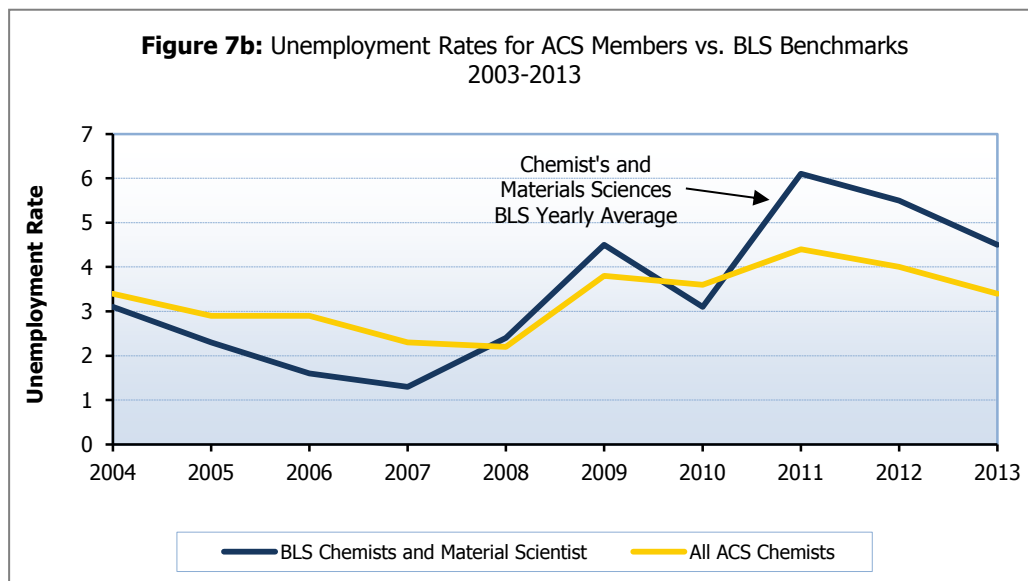
Unemployment in the United States peaked in 2009-2010 to levels not seen since the early 1980s. **Figure 7a** compares ACS members who are currently unemployed and seeking work with BLS data for (1) the general U.S. population, and more specifically with (2) unemployed people who have a bachelor's degree or higher.

Among ACS members the rate of unemployment is always much lower than it is for the general population. Among chemists, the highest rate of unemployment did not occur until 2011, lagging a year behind peak unemployment for the general population (2010) and for those with a bachelor's degree or higher (2010). The effects of the recession on job losses and transitions among chemists appear to have been more gradual than for the general population.

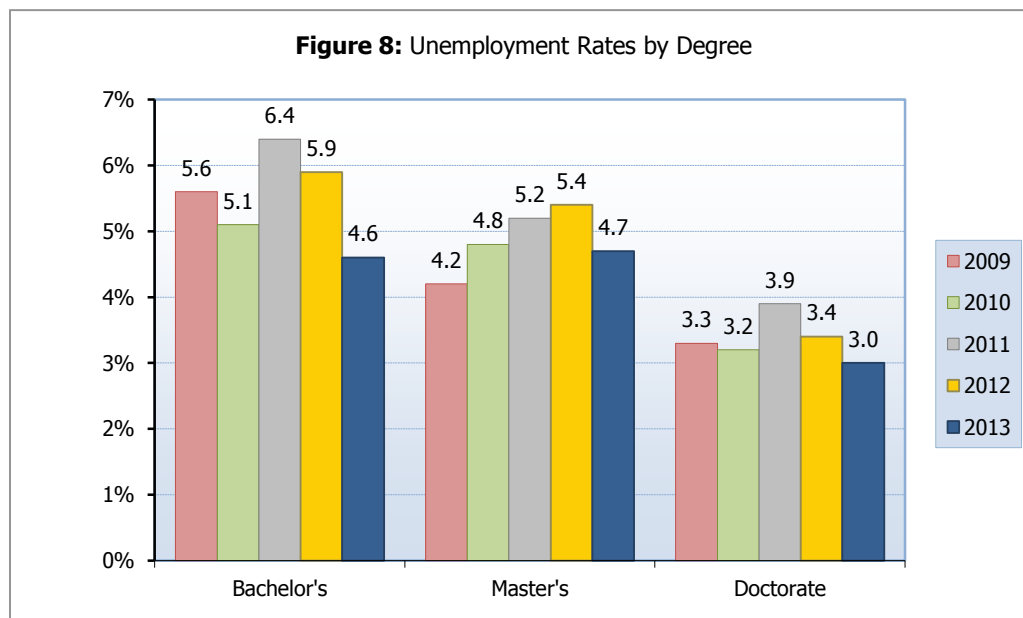


At 3.5% in 2013, it currently appears as though unemployment rates for chemists is following the same trajectory as the general population (7.6%) and for workers with a bachelor's degree or higher (3.4%) – all lower for the past two years.

**Figure 7b** shows that ACS employment data matches closely with the data from the BLS. It supports the ACS findings that the employment outlook for chemists is improving and back to 2009 levels.



**Figure 8** shows unemployment rates improved for all three degree categories in 2013. PhD's continue to have the lowest rate of unemployment at 3.0% unemployed and seeking work. Typically, higher education and qualification provide insulation from unemployment. However, the marked improvement among chemists with a bachelor's degree to 4.6% unemployment (from 5.9% in 2012) is nearly even with the 2013 rate among members with a master's degree of 4.7%.

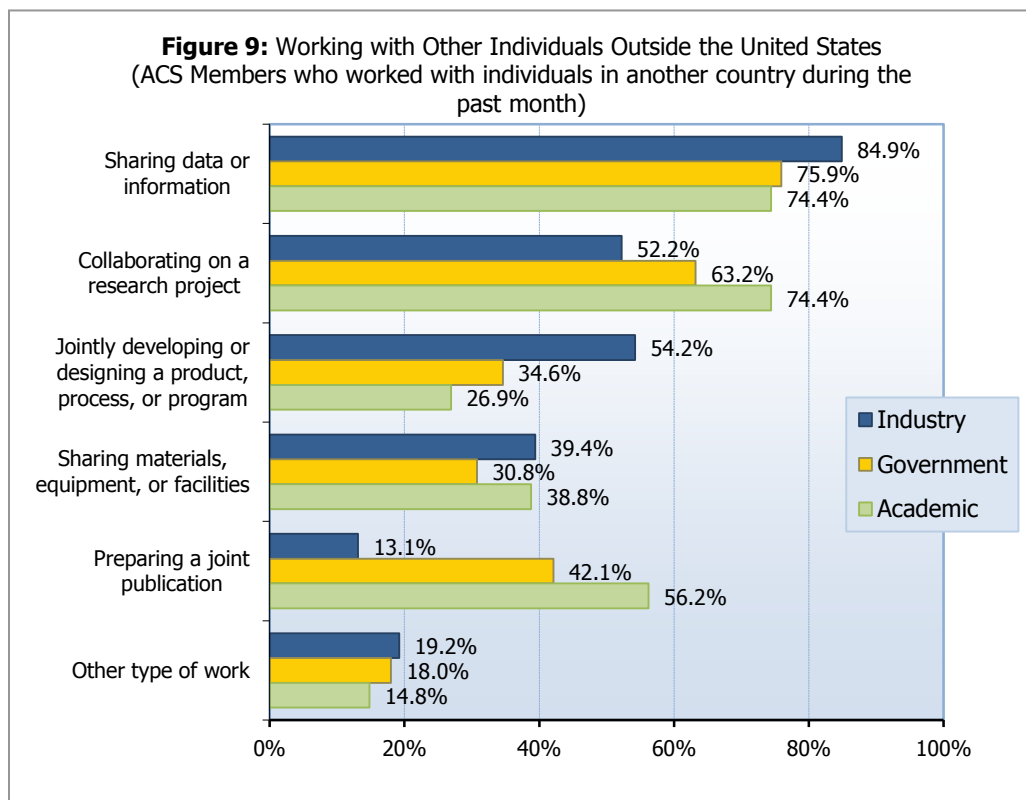


## GLOBALIZATION

Each year the ACS salary survey explores an ad hoc topic. The 2013 survey examines globalization and how it impacts work activities among ACS members.

### INTERNATIONAL COLLABORATION

During the past month when performing their principle job, the likelihood of whether or not an ACS member worked with individuals in other countries is most predicted by the member’s employment sector. Those employed in the industry sector (63.9%) were more likely to have worked with someone in another country during the past month than government (26.3%) or academics (26.9%). Overall, 47.3% of all ACS members worked with someone outside the United States during the past month.



**Figure 9** illustrates that *sharing data or information* is the most prevalent international collaboration activity for each employment sector, followed by *collaborating on a research project*. ACS Members within the industry sector were more likely to pursue *joint development of a product, process or program* (54.2%) than Government (34.6%) or Academia (26.9%). Academic (56.2%) and Government (42.1%) sector

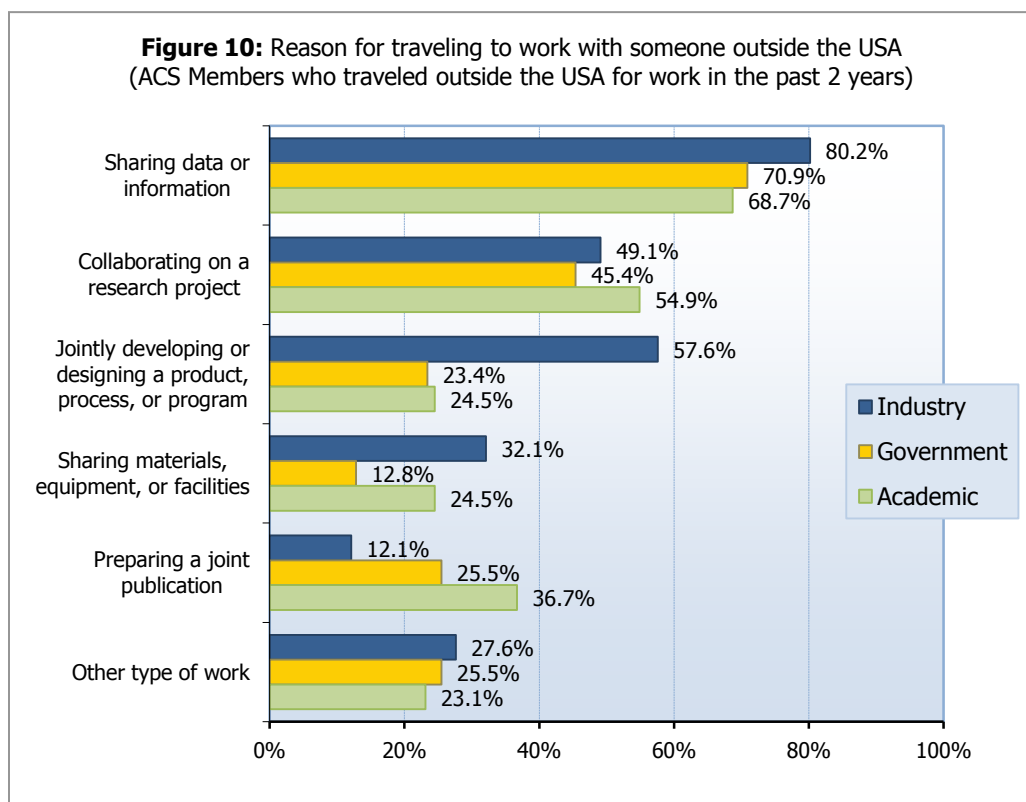


members were far more likely than those in Industry (13.1%) to prepare a *joint publication* with an international collaborator.

**TRAVEL OUTSIDE  
USA FOR WORK**

During the past 2 years, 30.6% of ACS Members traveled outside of the USA for work. Travel outside the United States to work with someone was most prevalent in industry (35.9%), compared with 27.1% for those employed in government and 24.5% for those employed in academia.

Sharing data or information is the most cited reason for travelling in all three sectors: 80.2% for the industry sector; government 70.9%; and, academic 68.7%.

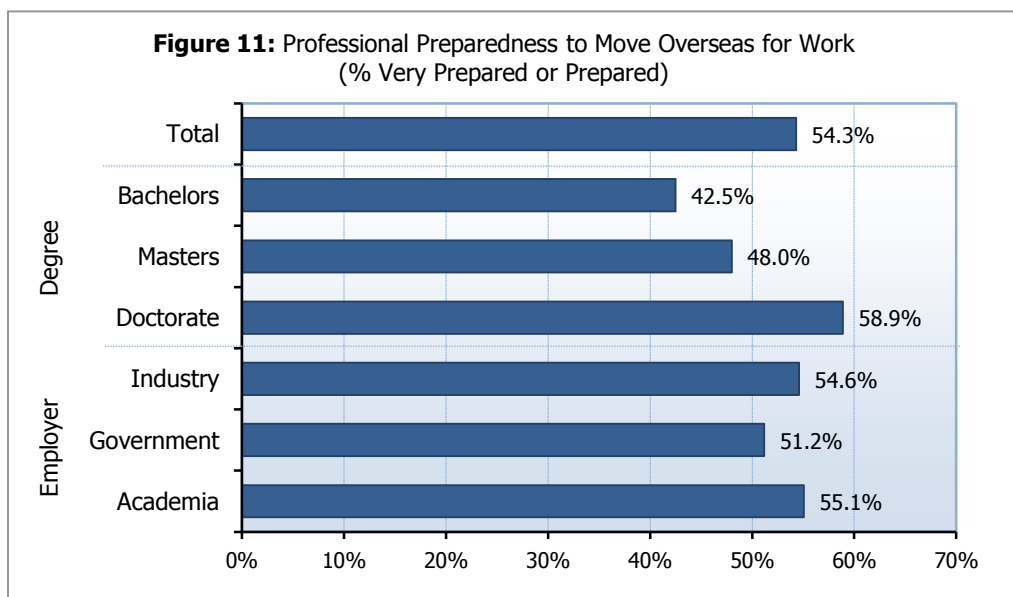


After that, where an activity was cited by a majority varied by employment sector. For respondents in the industry sector, 57.6% traveled outside the US to *jointly develop or design a product, process or program*; and, a near majority (49.1%) traveled to *collaborate on a research project*. In addition to sharing data, a majority in the academic sector (54.9%) traveled to *collaborate on a research project*. Traveling

to work closely with a collaborator provides greater opportunity to do *other types of work*, which roughly 1-in-4 members who traveled abroad cited as part of their activity.

**PREPAREDNESS TO MOVE**

As one might anticipate, members with a higher degree feel more confident in their professional abilities. Among PhDs, 58.9% say they are prepared professionally if they needed to move overseas for work compared with 48.0% of master’s degrees and 42.5% of bachelor’s degree holders.



**OTHER QUESTIONS**

The additional questions in the Globalization Module asked respondents about traveling outside the United States for professional association meetings, electronic travel (using Skype, WebEx, etc.), residing abroad for work or study, citizenship, and language fluency with English as well as other spoken languages.

In the past 3 years, 25.0% of all ACS members attended a professional association meeting – those employed in the academic sector were the most likely to have attended an association meeting at 29.4%.

Adoption or use of electronic travel such as Skype Conference or GoToMeeting is most prevalent amongst industry. In the past 2 years, 59.1% of industry sector members used some form of electronic travel, whereas a smaller proportion in the government sector (24.9%) or the academic sector (24.1%) did in the past 2 years.

**Table 11.** Other Globalization Questions

|  | All Members | Employment Sector |            |          |
|--|-------------|-------------------|------------|----------|
|  |             | Industry          | Government | Academic |
| Attended professional association meeting outside the US in the past 3 years | 25.0%       | 22.2%             | 28.4%      | 29.4%    |
| Participated in electronic travel in the past 2 years                        | 42.8%       | 59.1%             | 24.9%      | 24.1%    |
| Resided abroad during the past 3 years for work or study                     | 4.0%        | 2.4%              | 3.1%       | 6.4%     |
| A citizen of more than one country   | 6.5%        | 6.6%              | 5.0%       | 6.9%     |
| English is their native language   | 83.8%       | 84.3%             | 86.9%      | 81.8%    |
| Fluent in a spoken language other than English                               | 27.0%       | 25.9%             | 25.9%      | 29.1%    |

Among all respondents 4.0% resided abroad during the past three years for work or for study. Members in the academic sector were the most likely to have done so at 6.4%.

6.5% of all respondents reported that they are a citizen of more than one country. The rate of additional citizenship is lowest among ACS members employed in the government sector where the rate is 5.0%.

When asked whether English is their native language, 83.8% of all respondents cite English as their native language. The rate of native English speakers is fairly even across the three employment sectors, 84.3% for industry, 86.9% for government and 81.8% for academic. For 1-in-6 members (16.3%), their native language is not English. In all, 27.0% are fluent in a language other than English, either as a native or as a non-native language. However among the multi-lingual, 57.5% say that English was not their native language, so the majority of multi-lingual chemists had learned to speak English. When looking strictly at those who speak English as their native language, 13.6% say they are fluent in a non-English language.

## TECHNICAL NOTES

### THE SAMPLE

Participating member demographics appear in **Tables 12 and 13** by degree level, field of highest degree, gender, ethnicity, and age.

**Table 12.** Demographics

|                                | Number | Percent |
|--------------------------------|--------|---------|
| <b>Highest Degree</b>          |        |         |
| Bachelor's                     | 1,192  | 17.0%   |
| Master's                       | 1,103  | 15.7%   |
| Doctorate                      | 4,723  | 67.3%   |
| <b>Field of Highest Degree</b> |        |         |
| Chemical Engineering           | 437    | 6.2%    |
| Chemistry                      | 6,054  | 85.7%   |
| Non-Chemistry                  | 570    | 8.1%    |
| <b>Gender</b>                  |        |         |
| Male                           | 4,915  | 70.1%   |
| Female                         | 2,097  | 29.9%   |
| <b>Ethnicity</b>               |        |         |
| American Indian                | 14     | 0.2%    |
| Asian                          | 692    | 10.0%   |
| Black                          | 175    | 2.5%    |
| White                          | 5,891  | 85.2%   |
| Other or Multiracial           | 52     | 0.8%    |
| <b>Age</b>                     |        |         |
| 20-29                          | 410    | 5.9%    |
| 30-39                          | 1,598  | 22.8%   |
| 40-49                          | 1,845  | 26.3%   |
| 50-59                          | 2,056  | 29.4%   |
| 60-69                          | 1,082  | 15.5%   |

Overall, Table 12 Demographics describes the majority participant as holding a Ph.D. (67.3%), majored in a field of chemistry (85.7%), were white (85.2%), and were between the ages of 30-59 (78.5%). In addition, 7 in 10 respondents were males (70.1%) compared with 3 in 10 females (29.9%). A breakdown of field of highest degree, gender, ethnicity, and age per degree level appears in Table 12. In general terms, the majority of participants were white male chemistry PhDs between the ages of 30 and 59.

The target population of the ACS Comprehensive Salary and Employment Status Survey is ACS regular members under the age of 70 who have U.S. mailing addresses, valid email, and have neither student, retired, nor emeritus membership status. Volunteers were solicited from a randomized sample of 25,000 members drawn from a database consisting of ACS members meeting the above criteria. A total of 7,078 usable responses were received for a response rate of 28.3%.

In mid-March a postcard was sent by mail to all qualified members, followed by an email invitation a day later. Both invitations asked them to complete the survey online, or to request a paper copy. A total of 4 email reminders were sent out to the incomplete or missing responses.

**Table 13.** Demographics by Degree

|                                | Bachelors | Masters | Doctorate |
|--------------------------------|-----------|---------|-----------|
| <b>Field of Highest Degree</b> |           |         |           |
| Chemical Engineering           | 8.3%      | 5.4%    | 5.9%      |
| Chemistry                      | 82.4%     | 74.0%   | 89.7%     |
| Non-Chemistry                  | 9.3%      | 20.5%   | 4.4%      |
| <b>Gender</b>                  |           |         |           |
| Male                           | 63.6%     | 64.2%   | 73.3%     |
| Female                         | 36.4%     | 35.8%   | 26.7%     |
| <b>Ethnicity</b>               |           |         |           |
| American Indian                | 0.3%      | 0.3%    | 0.2%      |
| Asian                          | 4.0%      | 8.4%    | 12.0%     |
| Black                          | 3.5%      | 2.2%    | 2.3%      |
| White                          | 89.6%     | 86.8%   | 83.8%     |
| Other                          | 0.6%      | 1.1%    | 0.7%      |
| <b>Age</b>                     |           |         |           |
| 20-29                          | 21.0%     | 5.2%    | 2.1%      |
| 30-39                          | 17.8%     | 19.1%   | 25.0%     |
| 40-49                          | 20.9%     | 23.6%   | 28.4%     |
| 50-59                          | 28.8%     | 32.7%   | 28.7%     |
| 60-69                          | 11.4%     | 19.2%   | 15.6%     |

**DEFINITIONS**

For the purposes of the survey analysis, the following definitions were used:

*Chemist:* A respondent who indicated a work specialty of chemistry or biochemistry (categories 2 through 17 of Part 1, Question 3 of the questionnaire) or if a non-chemistry work specialty (categories 18 through 21 of the same question), a degree field of chemistry or biochemistry.

*Chemical Engineer:* A respondent who indicated a work specialty of chemical engineering (category 1 of Part 1, Question 3 of the questionnaire).

*Non - chemist:* A respondent whose work specialty category was other than chemistry or chemical engineering or if non - chemistry work specialty, no degree field of chemistry or biochemistry.

*Academic:* Pertaining to a Ph.D. working in a college or university (i.e., a private or public institution that awards a degree of associate or higher).

*Unemployed:* A respondent who was not employed and was seeking employment (category 4 of Part 1, Question 4 of the questionnaire). The unemployment rate was calculated to compare with the national rate by dropping those "not seeking" or "fully retired" from the labor force.

Respondents indicated their employment status, base annual salaries, and ages as of March 1, 2012. Each respondent's place of employment (current or most recent) determines his or her geographic region. The listing of states by geographic regions follows this section.

#### **DISCREPANCIES AMONG TABLES**

Some pairs of tables contain totals that should be identical but are not. For example, two tables that represent information about Ph.D. respondents should show the same total number of Ph.Ds, but for various reasons might not. Missing response items in individual surveys generally causes this phenomenon. Not every respondent answers all questions all of the time. To illustrate, if one table groups the Ph.Ds according to specialty and another groups them according to work function, the totals will differ unless the number who did not indicate their specialty is the same number as those who did not indicate their work function.