



## ACS Comprehensive Salary and Employment Status Survey

### *Frequently Asked Questions*

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## 1. How are the data collected?

The *ACS Comprehensive Salary and Employment Status Survey* is conducted each spring and measures the employment status of “working” domestic ACS members—active ACS regular members under the age of 70 and living in the U.S., and excluding student, retired and emeritus members. The first such survey was conducted in 1941, and it has been conducted in-house annually since 1971.

The member survey typically involves a random sample of approximately  $\frac{1}{4}$  of ACS regular working members. In 1975 and 1980, a larger sample was taken. In recent years, the entire “working” membership has been included every fifth year to provide more detail on the economic status of women and other subgroups, such as Black and Hispanic chemists and those in emerging fields.

The survey has been conducted each year in essentially the same way it has been in the past in order that data may be compared over time. The survey asks for and reports salaries as of March 1 of the year studied. For the 2000 census survey (ChemCensus 2000) of almost 95,000 members meeting the criteria, a Web version of the survey was introduced.

Figures on the unemployment rate and salaries are available at the Fall national meeting and are reported to the Committee on Economic and Professional Affairs. Final data are available in June and are sent to *Chemical & Engineering News* and *Today's Chemist at Work* for publication in late July or early August. A full report containing more detailed tables is available for purchase in late September or early October. The Web version is released with the printed report.

## 2. How accurate are the data?

We have conducted telephone follow-ups of non-responders to determine if there is any response bias in the survey. In the 1991 survey, both non-responders and responders had a 1.6% unemployment rate. The mean salary for non-responders was \$57,982 and the mean salary for responders was \$57,007. Thus, based on these telephone interviews, we have no reason to believe that non-responders differ greatly from responders to the survey. More specifically, we have no reason to believe that non-responders are any more or less likely than responders to be unemployed or that non-responders earn significantly higher or lower salaries than responders.

**Table 1. ACS Member Data: Respondents and Nonrespondents**

<b>Employment status</b>	<b>Respondents</b>	<b>Nonrespondents</b>
<b>Full-time</b>	92.4%	92.6%
<b>Part-time</b>	1.8%	1.8%
<b>Postdoc</b>	2.4%	1.1%
<b>Seeking employment</b>	1.6%	1.6%
<b>Not seeking employment</b>	1.8%	2.9%
<b>Total</b>	9859	377
<b>Salaries</b>		
<b>Mean</b>	57,007	57,982
<b>Standard deviation</b>	26,899	28,890
<b>Standard error</b>	285	1,685
<b>Median</b>	52,000	55,000

### 3. Are the ACS data inaccurate because they are self-reported rather than employer-reported?

No, comparisons between the ACS data and data from employer-reported surveys show very little difference in the results, even when the comparisons are not very precise. For example, the Hay Group conducts a salary survey of establishments for the Department of Energy—The National Compensation Survey of Research and Development (R&D) Scientists and Engineers. This is a survey of medium and large-sized organizations (industrial, federal, nonprofit, academic) in which R&D is performed and in which at least 100 degreed scientists and engineers in R&D are employed. A rough comparison of their results with ACS results shows a remarkable similarity.

**Table 2. Mean Annual Salaries of Nonacademic Chemists Employed in R&D, 1990**

	Hay*	ACS
<b>BS</b>	\$39,252	\$39,357
<b>MS</b>	\$46,416	\$46,046
<b>PHD</b>	\$57,360	\$57,443

\*monthly salaries multiplied by 12.

Similarly comparisons can be made for academic salaries. The College and University Personnel Association annually surveys 282 public colleges and universities and 484 private colleges and universities. CUPA figures for public schools refer to faculty on 9/10 month contracts and who spend 51% or more of their time teaching. If we compare CUPA and ACS figures for full-time employed academic chemists in public schools on 9/10 month contracts and only those who spend 51% or more of their time teaching we get the following average salaries:

**Table 3. Mean Annual Salaries of Academic Chemists, 1990**

	CUPA	ACS
<b>Full Prof</b>	\$50,301 (1065)	\$49,441 (148)
<b>Assoc Prof</b>	\$39,355	\$40,498 (58)
<b>Asst Prof</b>	32,171 (421)	32,888 (47)
<b>New Asst Prof</b>	30,720 (96)	30,900 (15) (0-2 yrs since PhD)
<b>Instructor</b>	25,131 (67)	25,721 (15)

There is not a significant difference between self-reported and employer-reported salaries. Doing an employer-based survey is good to target a particular group, e.g. R&D scientists and engineers, technicians, faculty. In this case, a self-reported survey would be more inefficient than an employer based survey because only a small portion of the sample may fit into the target group.

But, doing a self-reported survey for a large and diverse group is a good idea if you want more comprehensive information than a series of smaller more targeted surveys. The ACS survey is the best source of accurate, current salary data on chemist's salaries in a wide range of employment environments.

In comparing salaries, it is important to compare similar groups. In the above examples, we would not compare the Hay results with ACS results on chemists as a whole in industry because many chemists in industry are in R&D management as opposed to R&D. Nor would we compare the CUPA results with ACS results on all faculties as opposed to just teaching faculty in public schools.

The more dissimilar the groups being compared, the more likely the results will differ. The most important criteria for the comparison of salaries are highest degree, employment type, length of experience, supervisory status, and to some degree, employer size. The job title or function that one performs makes relatively little difference except for management versus non-management. Ph.D.s in basic research earn about the same as those in applied research, marketing, production, chemistry information services, or consulting. Those in general management or R&D management earn much higher salaries. Similarly, specialty makes relatively little difference—organic chemists, polymer chemists, analytical chemist, material scientists all make about the same. Geographic region makes similarly little difference in salaries. Salaries of chemists with similar degrees, similar length of experience, and similar employers are similar no matter what region of the country they are employed.

## 4. Are the salaries published each year inflated?

Some argue that the salaries reported from the ACS Comprehensive Surveys are inflated. As the previous discussion shows, ACS salaries are very closely related to other reported data. For ACS members, the salaries are not statistically different. By most who study these subjects, the ACS data is considered very strong, especially considering the long history of data available for analysis.

The problem of whether ACS-reported salaries are inflated appears to be a misunderstanding of the *median* as a measure and just how much can be described by it. The median salary is a summary measure of the sample of ACS members and omits a great deal of the description of chemists' salaries. It represents one person, who is to be placed with 50 percent of the respondents above and 50 percent of the respondents below. Therefore, for half of the respondents the measure is higher than their salaries. The median is meant more to observe trends over time than a particular situation.

The median measure is used as a descriptor to lessen the chance of undue influence of very high salaries. The *mean* (average), which is the sum of the respondents' salaries divided by the number of respondents, is often skewed toward higher numbers because the upper limit to salaries is virtually unlimited, whereas salaries never fall below zero.

In the full report, salaries are reported at the 25<sup>th</sup> percentile, the 50<sup>th</sup> percentile (median) and at the 75<sup>th</sup> percentile. The mean and standard deviation are also reported. The percentile breakouts allow the reader the information on a middle range of salaries and with ranges reported by multiple subgroupings in both academic and non-academic settings.

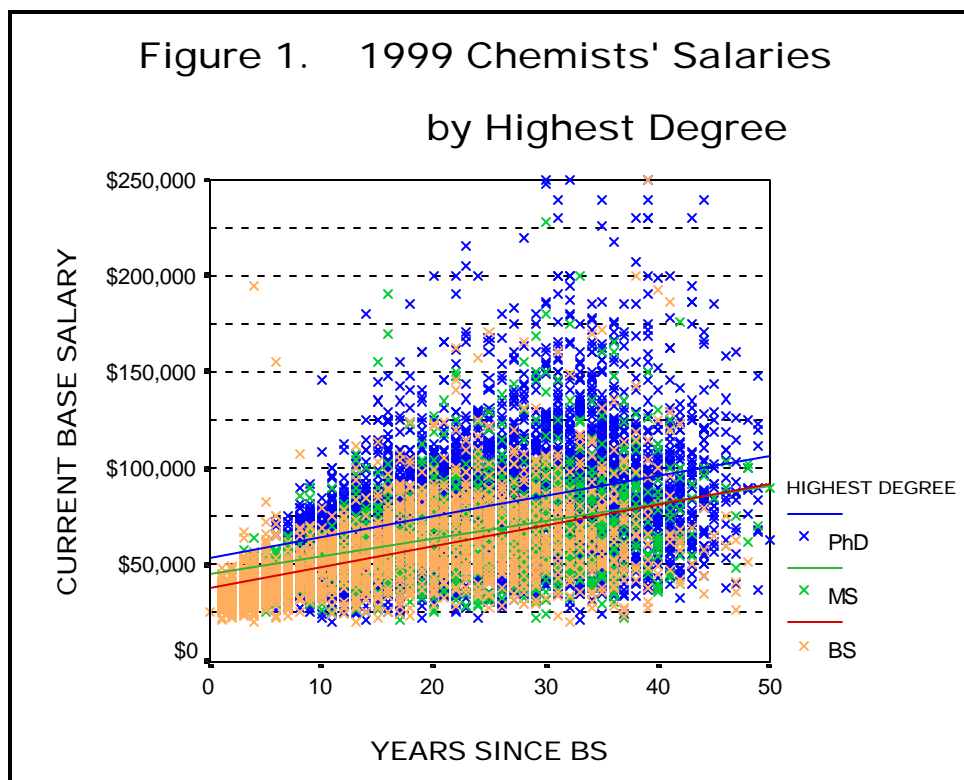


Figure 1. represents the 1999 salaries of about 9,000 ACS chemists. The lines in this picture are showing regression lines built around the means by degree. Figure 1. shows a great deal about the salaries of most of the 1999 ACS working chemists. It shows far more

about the diversity of salaries than either the median or the mean. It shows how widespread salaries are and ever more diverse as a career progresses. It also shows that overall, the means of BS and MS degrees are relatively close, whereas, the Ph.D.s start higher and widen the gap throughout their careers.

On the other hand, this picture does NOT tell how this group relates to any previous group or even to itself last year. For those observations, we need to look at the summary measures over time. Also, Figure 1. does not show the maximum salaries, as the salaries were purposely cutoff at \$250,000 so that the graph could contain more detail for 98 percent of the 1999 chemists.

## **5. This data is for all chemical professionals and I am a new graduate. Where does one look for information on starting salaries?**

The starting salaries are taken from the New Graduate Study Survey results. The reported data mainly covers inexperienced graduates, which includes those graduates with less than 12 months of experience. This information does not cover those who are in postdoctoral positions prior to seeking employment.

The New Graduate Study starting salary tables are available at this Website.

## **6. Are the ACS data acceptable for immigration verification of salary ranges?**

The ACS data are used regularly for verification of salary range for immigration purposes. Many state and local governments also use the ACS data as an aid for setting salaries and acceptable ranges for employees and immigration requirements.

Generally, two tables are needed for immigration inquiries. If the information is required for a postdoc position, there is a tables for postdocs in both the ACS Comprehensive Survey "Salaries" and the New Graduate "Starting Salaries".

If you have further questions, especially questions you would like to see addressed here, e-mail us at [careers@acs.org](mailto:careers@acs.org)