

**Division of Professional Relations  
1155 16th Street, N.W.  
Washington, D.C. 20036**

DENNIS CHAMOT, *Editor*



**No. 45  
December 1989**

## **FROM THE EDITOR...**

### **Report from Miami Beach**

A couple of items of interest from the Miami national meeting were actually continuations of earlier doings. You may recall that there had been an attempt at an earlier meeting to amend the ACS bylaws to express the view that no member of the Society could be excluded from open meetings of the Society, local sections, etc. Unbelievably, that proposal generated a huge amount of discussion, and the petition was sent back for more work. I am happy to be able to report that the amendment passed this time, without Council debate (there was some debate at other times, but it became clear that those opposed were in a very small minority, and they had the grace to bow out).

Less pleasantly, I have to report that Attila Pavlath was not reappointed as chairman of the Membership Affairs Committee for 1990. While this is certainly the prerogative of the incoming president, many believe that the move was directly in retaliation for Attila's very active campaign to redesign the Society's dues structure, and particularly, for leading the effort that resulted in a zero dues increase for next year. It is clear that the Council, and the membership, is quite concerned about how dues money and other

income is being spent. Replacing a committee chair does not change that. The issue has to be dealt with. As Attila himself indicated, this has happened to him before; he is still here, and will be long after this incident has passed from memory. He continues as an active member of the DPR Executive Committee, and as a Councilor from the California Section. We will all continue to benefit from his dedication and service.

### **By laws**

You may recall that the DPR election materials that you received some time ago included a few bylaw amendments. The ballot itself inadvertently did not contain a place for marking approval or disapproval of the suggested changes. This is being corrected at this time. You will find an insert in this issue of the Bulletin that reprints the bylaw changes, along with a ballot. Please take a moment to review the material, and return your ballot.

As you will note, most of the changes are housekeeping or editorial in nature. There are a few substantive ones. For example the Executive Committee is to include two additional members-at-large, as well as the

Program Chairman. This should be very helpful in permitting more members of the Division to participate in its governance.

Suggestions for future revisions should be sent to Bela Buslig (507 Victoria Boulevard, Auburndale, FL 33823).

### **Henry Hill Award**

The plan is to have the next Henry Hill Award be presented in Boston, at the Spring ACS meeting. While the award has been given at the Fall meeting in the past, it was felt that this would be an additional way to honor Henry's memory, as he was very active in the Northeastern Section of ACS. So if you missed any mention of the award in the reporting of the Miami Beach ACS meeting, that's the reason—postponement until Boston.

By the way, suggestions for awardees are always welcome. Past recipients include Alan Nixon, Gordon Nelson, Warren Niederhauser, Fred Owens, and William Bailey. Send your nominations, along with a brief statement of why the person is being nominated, to Dr. Bela Buslig, 507 Victoria Boulevard, Auburndale, FL 33823.

—Dennis Chamot

# EMPLOYMENT TRENDS IN CHEMISTRY: LEVELS, EMPLOYERS AND WORK ACTIVITIES

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A general picture of the employment situation in the 1980s can be gained by examining the unemployment rate over time, the rate of employment growth, and several indicators of demand. The ACS salary survey data on chemists unemployment rates from 1971 to 1989 show a series of peaks and valleys that correspond generally to the business cycle. (Table 1) Unemployment was low in the beginning of the 1980s, low in the last few years, and high from 1982 to 1986.

Compared to other scientists in the U.S.,

the unemployment rate for chemists was lower than for all scientists throughout the decade 1976-1986.(1) For example, in 1986, the NSF unemployment rate figure was 1.7% for chemists and 2.1% for all scientists. On the other hand, chemists experienced a slower rate of employment growth from 1976-1986 than did all scientists--on average 4% per year versus about 8% per year for all scientists.

Examination of trends in several indicators

of demand also gives a feel for employment trends in the 80s. NSF data on the percent of chemists employed in science and engineering, on the percent of chemists underemployed in science and engineering, and on salary levels of scientists, give a picture of the employment situation of chemists relative to other scientists. ACS starting salary survey data on the percent of BS chemists employed in chemistry or chemical engineering, the percent of new, chemistry doctorates accepting postdoctoral

Table 1  
UNEMPLOYMENT RATES OF  
CHEMISTS, 1971-1989

<u>Year</u>	<u>Chemists</u>
1971	2.9%
1972	3.2%
1973	1.8%
1974	1.4%
1975	1.6%
1976	1.9%
1977	1.5%
1978	1.4%
1979	1.1%
1980	0.9%
1981	1.1%
1982	1.5%
1983	2.2%
1984	1.7%
1985	1.4%
1986	1.7%
1987	1.1%
1988	1.0%
1989	1.0%

Source: ACS Salary Surveys

Table 2  
BS CHEMISTRY GRADUATES  
PERCENT EMPLOYED IN  
CHEMISTRY OR CHEMICAL  
ENGINEERING 1975-1988

<u>Year</u>	<u>Labor Force*</u>	<u>Full-time** Employed</u>
1975	59.5	76.7
1976	56.4	71.3
1977	59.2	73.8
1978	58.9	72.6
1979	60.6	75.3
1980	NA	NA
1981	57.8	74.9
1982	52.4	73.4
1983	49.6	71.9
1984	55.1	75.3
1985	58.4	76.5
1986	64.4	80.3
1987	61.9	78.9
1988	68.0	82.3

\*Percent employed in chemistry or chemical engineering out of those in the labor force (i.e., those employed or those seeking employment).

\*\*Percent employed in chemistry or chemical engineering out of those who are

Table 3  
PERCENT OF DOCTORAL  
CHEMISTRY GRADUATES WHO  
ACCEPT POSTDOCTORAL  
FELLOWSHIPS 1972-88

<u>Year</u>	<u>Percent</u>
1972	46
1973	40
1974	43
1975	47
1976	49
1977	43
1978	33
1979	38
1980	29
1981	29
1982	31
1983	34
1984	38
1985	31
1986	47
1987	48
1988	35

fellowships, and the median starting salaries of new graduates show how the employment picture changed during the 1980s.

The NSF data indicate that the percent of chemists employed in science and engineering was higher than that of other scientists from 1976-86.(2) For example, in 1986, 91% of chemists, but only 79% of all scientists, were employed in science and engineering.

The NSF measure of underemployment is the fraction of chemists who are employed part-time, but are seeking full-time employment, plus the chemists who are not employed in science and engineering, but are seeking science and engineering employment, out of all employed chemists. By this definition, the percent of chemists underemployed in science and engineering was more or less half that for all scientists

throughout the decade 1976-86.(3) For example, in 1986, 1.8% of chemists were underemployed versus 4.5% of all scientists.

NSF data also show that salaries of experienced chemists were higher than those for other scientists (except physicists) for all degree levels.(4) For example, in 1986, the mean salary for chemists was \$38,900; the mean salary for all scientists was \$35,700; and the mean salary for physicists was \$45,900. Generally, salaries for chemists are about the same or lower than for other physical scientists and engineers, and are higher than those for life scientists and social scientists.

The ACS starting salary data indicate that the percent of full-time employed BS chemistry graduates who are employed in chemistry or chemical engineering dropped in the early to mid 1980s, but has increased almost steadily since then (with the exception of 1987). (Table 2) Also, the percent of new chemistry doctorates who accept postdoctoral fellowships (which, if high, may indicate low demand) increased from 1980 to 1984 and from 1985 to 1987. (Table 3).

Furthermore real starting salaries of new graduates increased more rapidly for PhDs in the 1980s than in the 1970s. Starting salaries for all degree levels rose less than inflation did in the 1970s. The CPIW increased by 87% between 1970 and 1979, whereas starting salaries increased only 63% for BS chemists, 68% for MS chemists, and 56% for PhD chemists. In the 1980s, starting salaries for BS and PhD chemists rose faster than inflation. The CPIW rose 41% between 1980 and 1988, whereas starting salaries increased 46% for BS chemists, 39% for MS chemists, 53% for PhD chemists.

Indicators such as these show that generally and comparatively, the employment situation of chemists in the 1980s was better than that of some groups such as social scientists and life scientists, and that the employment situation has improved in the last few years. The market appears to have opened up for new graduates at all degree levels, and probably more so for PhDs than for BS chemists.

Looking at overall trends in employment of chemists ignores, however, the differing employment statuses of various groups within the profession of chemistry. Employment and unemployment levels vary by employer, by work activity, and by age, among other factors.

Unemployment rates were highest and most erratic in industry and in "other nonacademic" employment in the 1980s. (Table 4) The long-term employment trends indicate a shift away from industrial employment and toward "other nonacademic" employment (i.e., employment in the service sector—hospitals, independent labs). The ACS salary survey data indicate that the fraction of chemists employed in industry declined from 1960 to 1978 and the fraction employed in academia and in the "other nonacademic" sector increased, although there has been relatively little change in the 1980s. (Table 5) Similarly,

Table 4  
CHEMISTS UNEMPLOYMENT RATES BY SECTOR,  
WORK FUNCTION, INDUSTRY, AND AGE  
1980-1989

	Year									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<i>SECTOR OF EMPLOYMENT</i>										
Industry	0.9	1.1	1.6	2.4	1.8	1.5	2.2	1.4	1.0	1.0
College/ University	0.6	0.7	1.3	1.5	1.3	1.2	0.8	0.8	0.5	0.9
Government	0.4	0.8	0.8	1.2	0.3	0.7	0.3	0.4	1.2	0.4
Other Nonacademic	2.0	3.2	2.6	3.8	2.1	1.8	1.7	1.0	2.2	2.5
<i>WORK FUNCTION*</i>										
R&D										
Management	1.0	0.8	0.9	2.0	1.4	1.2	1.6	1.0	0.7	0.5
Basic Research	0.5	0.4	1.0	1.0	0.7	0.9	1.1	1.1	0.8	
Applied Research	0.7	1.0	1.7	2.1	1.9	1.3	1.7	1.2	1.3	1.0
General Management		1.7	1.5	1.6	1.5	1.6	2.6	0.6	0.9	1.6
Marketing	1.1	1.1	2.1	2.7	1.9	1.9	3.5	1.5	0.8	1.1
Production	2.1	2.0	2.3	3.2	2.4	2.1	3.6	1.3	1.2	1.8
Forensics	2.2	2.2	1.7	4.1	0.9	2.1	1.3	1.3	2.4	1.0
<i>TYPE OF INDUSTRY**</i>										
Nonmanufactur- ing	1.6	1.0	3.6	4.6	3.6	2.1	3.1	2.0	2.4	1.6
Chemicals	0.9	0.8	1.2	2.3	1.2	1.2	2.7	0.8	0.9	1.2
Coatings	0.6	0.3	1.1	1.1	2.4	1.5	1.5	2.2	2.1	0.5
Food	2.0	2.8	1.9	1.7	2.1	2.6	1.9		0.6	0.5
Metals	1.1	1.9	1.9	4.0	5.1	4.8	4.4	6.3		3.4
Petroleum	0.9	0.8	1.1	2.0	2.5	1.0	2.2	2.3	0.5	1.0
Pharmaceuticals	0.3	0.9	1.2	1.6	1.0	1.6	1.3	0.4	0.4	0.5
Plastics								1.6	0.4	0.3
Rubber		1.2		0.7	1.0	0.4	2.2	2.2		
Other	1.2	1.5	2.0	2.8	2.3	1.5	2.1	1.8	1.5	0.9
<i>AGE</i>										
20-29	1.6	1.1	1.5	2.7	2.5	1.0*	1.4	1.0	1.3	0.5
30-49	0.7	1.1	1.5	2.2	1.5	1.4*	1.6	1.1	0.9	0.9
50-69	0.9	1.1	1.6	2.1	1.8	1.8*	2.2	1.2	1.1	1.4

\* Nonacademic chemists only

\*\* Industrial chemists only

Source: ACS Salary Surveys

NSF data show the growth rate of chemists in education was higher than that for chemists in industry from 1976-1986. (5)

Within industry, chemists employed in the metals and petroleum industries, and in nonmanufacturing, experienced the highest unemployment in the 1980s. Chemists employed in the pharmaceuticals industry experienced the lowest unemployment. In terms of employment distribution, the fractions of chemists employed in the metals, rubber, and petroleum industries have decreased since 1986, while the fraction of chemists employed in nonmanufacturing has increased. (Table 6)

Not only do employment and unemployment levels vary by type of employer, they vary by work activity or work function, and by degree of experience (here measured by age). (table 4) Within industry, chemists employed in the areas of marketing and sales, production, forensics, and applied research experienced the highest unemployment in the 1980s. Chemists employed in basic research experienced consistently low unemployment during this period. And, management (both R&D management and general management) experienced lower than average unemployment. In terms of overall employment trends, the percent of chemists working in R&D and in management decreased in the 1980s and the percent of chemists engaged in teaching increased. (Table 7)

An examination of unemployment rates by age shows that younger chemists (those less than 30 years old) experienced higher unemployment rates in the early 1980s, whereas older chemists had high unemployment rates from 1985 on. It appears that in hard economic times, or in the case of the 1980s, industry restructuring, employers tend to reduce staffing levels initially by hiring less new graduates, and when they need to cut even further, by reducing the number of senior staff.

In the near future, the unemployment rate will probably go up. In general, national economic growth seems to be slowing down: housing starts are down, auto inventories are up, GNP growth has slowed,(6) chemical industry productivity is down, and chemical industry unit labor costs are up.(7) To the extent the economic status of the chemical industry follows the general pattern of the national economy, chemists are likely to experience higher unemployment sometime in the next few years.

Both the Bureau of Labor Statistics and the

National Science Foundation predict slower than average growth for chemists employment through the year 2000. Under moderate growth scenarios, BLS projects a growth rate of 11% from 1986 to 2000 in the number of chemist jobs, (8) and the National Science Foundation projects an 8% increase in the number of physical scientist jobs from 1986 to 2000. (9)

Based on past trends, continued growth should occur in the service sector. Within industry, employment of chemists should remain strong in the chemicals industry, in

Table 5  
EMPLOYED CHEMISTS DISTRIBUTION BY SECTOR, 1941-1989

<i>Year</i>	<i>Industry</i>	<i>Academe</i>	<i>Government</i>	<i>Other Nonacademic</i>
1941	59.7	14.3	19.8	6.2
1943	65.4	9.4	18.9	6.3
1955	65.9	14.5	8.5	11.1
1960	70.4	16.5	9.1	4.0
1962	69.5	17.2	9.4	3.9
1964	67.4	18.8	10.1	3.7
1966	68.2	17.8	10.1	3.9
1968	67.6	19.4	8.2	4.6
1970	64.4	23.3	8.0	4.3
1972	62.6	22.7	10.1	4.6
1974	60.8	23.0	10.7	5.5
1976	59.7	23.6	10.9	5.8
1978	61.6	23.3	9.7	5.4
1980	61.7	23.5	9.2	5.6
1982	60.6	23.7	9.9	5.8
1984	57.6	28.9	8.9	4.6
1986	61.6	22.2	10.1	6.1
1988	61.7	23.4	9.0	5.9

Source: ACS Salary Surveys

Table 6  
EMPLOYED INDUSTRIAL CHEMISTS DISTRIBUTION BY INDUSTRY

<i>Year</i>	<i>Chemicals</i>	<i>Coatings</i>	<i>Food</i>	<i>Metals/Minerals</i>	<i>Paper</i>	<i>Petroleum</i>	<i>Pharmaceutical</i>	<i>Rubber</i>	<i>Other</i>	<i>NonManuf.</i>
1980	34.6	5.7	4.9	3.1	1.7	5.5	16.4	2.9	18.9	6.3
1982	34.5	5.1	3.9	2.9	1.3	6.5	16.4	2.4	20.4	6.4
1984	33.9	5.2	3.9	2.9	1.4	6.0	17.3	2.1	19.7	7.6
1986	27.4*	5.9	3.7	2.9	1.6	6.4	17.6	2.4	24.5	7.6
1988	26.5**	4.0	3.6	1.7	1.3	4.0	16.1	1.5	29.1	12.3

\* Agricultural Chemicals, Other Chemicals and Biochemical Products

\*\* Basic Chemicals, Specialty Chemicals, Agricultural Chemicals and Biochemical Products

Source: ACS Salary Surveys

plastics, and in pharmaceuticals. Employment may decrease in the food industry and in petroleum, and will remain low in the metals (steel) industry.

For the near future, employment in basic research should remain relatively stable. Because the unemployment rate for chemists engaged in production and in general management is going back up unemployment in these areas may continue to go up for the next few years, and unemployment among chemists involved in sales and marketing, i.e., the more market-oriented functions, may also go up.

Unemployment rates for younger chemists may be higher than those for other age groups in the early part of the 1990s.

1. National Science Foundation, "Profiles—Chemistry: Human Resources and Funding" (NSF 87 307).

2. Ibid

3. Ibid

4. Ibid

5. Ibid

6. Department of Commerce, Survey of Current Business, July 1989, Vol.69, No. 7.

7. Chemical and Engineering News, September 4, 1989, p. 11. 8. Bureau of Labor Statistics, "Projection 2000", March 1988 (Bulletin 2302), p.49.

8. Bureau of Labor Statistics, "Projections 2000", March 1988 (Bulletin 2302), p 49

9. National Science Foundation, "Science Resources Highlights", December 30, 1988 (NSF)

Table 7.  
EMPLOYED CHEMISTS, DISTRIBUTION BY WORK FUNCTION

Year	Management	R&D	Marketing/Production	Teaching	Other
1941	13.5	43.5	4.6	17.3	21.1
1943	17.9	48.0	4.5	13.1	16.5
1955	17.8	49.0	5.0	11.8	16.4
1960	26.3	47.5	13.0	9.6	3.6
1962	25.3	45.8	15.3	10.3	3.3
1964	22.4	48.7	14.5	10.6	3.8
1966	23.8	37.4	16.6	9.3	12.9
1968	24.9	42.8	14.6	13.5	4.2
1970	27.6	39.7	13.9	14.4	4.4
1972	16.7	49.3	12.3	18.8	2.9
1974	28.2	32.3	8.6	18.5	12.4
1976	22.9	37.9	12.7	17.9	8.6
1978	22.3	37.2	12.1	19.2	9.2
1980	20.1	37.1	11.9	22.6	8.3
1982	18.0	37.0	11.6	25.1	8.3
1984	16.1	34.3	11.8	28.3	9.5
1986	20.0	44.0	12.0	11.0	13.0
1988	21.0	43.0	12.0	13.0	11.0

Source: ACS Salary Survey

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