



SALARIES & JOBS

Jobs for chemists remain depressed as payrolls nationally remain below the peak set in 2001

MICHAEL HEYLIN, C&EN WASHINGTON

IT'S BEEN A TOUGH FOUR YEARS FOR working people in this country. However much the statistics on employment nationally are spun—and they are being spun ever more furiously as the days to the presidential elections dwindle—the national job market has not been pretty since the biggest and longest economic boom in U.S. history finally ran out of steam at the end of 2000.

Although there has been some job growth over the past year, the total number of people on payrolls today is still lower than it was at its peak in March 2001. This ongoing pause in overall job growth is the most prolonged since the Great Depression.

The job market for chemists is no exception. And it will have a particularly challenging path to recovery.

This year's American Chemical Society survey of the salary and employment status of its members in the domestic workforce (C&EN, Aug. 16, page 26) revealed a record-high unemployment rate of 3.6%. This rate is up slightly from 3.5% last year

and well above the rate of 1.5% in 2001, which indicated essentially full employment. Unemployment never drops to zero. Even in the best of times, there are al-

ways 1% or so of people between jobs or just starting to look for a job. For chemists with jobs, salaries have held up fairly well. The median salary of \$87,000 for individual chemists, as of March 1 this year, was up from \$83,400 a year earlier.

ACS's annual surveys of the starting salaries and employment status of new chemistry graduates indicate that a declining percentage of them are finding full-time permanent employment (C&EN, April 19, page 51). For Ph.D. graduates, this decline has been from 45% of the 2001 class to 37% of the 2003 class.

These surveys also show softness over the past couple of years in graduates' starting salaries. For instance, the median full-time salary for 2003 Ph.D. graduates was \$68,500. This was up from the \$68,000 for the 2002 class but still down from \$70,000 for the 2001 class.

In the overall job scene, according to the Bureau of Labor Statistics' (BLS) measure of employment that is based on monthly payroll data from 400,000 employers, the number of people on payrolls this September was up by 1.8 million from its low in August of last year. But this still left it 940,000 shy of its peak set 42 months earlier. If the recent rate of growth of about 140,000 workers on payrolls per month persists, it will be next year before total payrolls are back to their 2001 peak.

For the eight earlier employment dips since World War II, it took an average of 29 months to recover from a payroll decline and break back into new high ground. If the average timeline for these earlier dips had been followed this time, payrolls today would be more than 3 million higher than they were in March 2001, instead of almost 1 million lower.

BLS's other measure of employment, which is based on data collected from a sample of 60,000 households, shows a 1.74 million gain in the employment level between March 2001 and this September. Most of this gain has come in the past 12 months. However, even this recent rate of gain of about 150,000 per month is somewhat shy of the rate of job creation needed to keep up with the built-in growth in the workforce due to population growth.

JOB NUMBERS SINCE MARCH 2001

Big declines from employment peak for all chemical sectors except pharmaceuticals

THOUSANDS	U.S. PAYROLLS		
	MARCH 2001	AUGUST 2004	CHANGE
MANUFACTURING^a	16,931	14,384	-15.0%
All chemicals	971.7	892.4	-8.2
Agricultural chemicals	47.3	36.3	-23.3
Basic chemicals	185.8	159.0	-14.4
Paints, coatings & adhesives	76.1	68.3	-10.2
Pharmaceuticals	278.2	300.3	7.9
Resin, rubber & fibers	131.4	110.5	-15.9
Soaps & cleaning compounds	128.7	111.2	-13.6
Other chemical products	124.2	110.1	-11.4
Chemicals minus pharmaceuticals	693.5	592.1	-14.6
OTHER SECTORS			
Communications equipment	252.9	157.9	-37.6
Computers & electronic products	1,852.0	1,351.1	-27.0
Industrial machinery	158.2	122.1	-22.8
Plastics & rubber products	919.9	808.5	-12.1
Primary metals	596.6	463.9	-22.2
Semiconductors & electronic equipment	703.5	460.0	-34.6
Textile mills	352.2	234.1	-33.5
TOTAL NONFARM^a	132,507	131,567	-0.7%

^a Data are for September 2004. SOURCE: Bureau of Labor Statistics

BY THE NUMBERS

Jobs, Presidents, And Politics

Employment statistics, though seemingly hard and unequivocal, are always open to interpretation. This is never more so than during a presidential election campaign, especially one that comes at a time, like now, when job creation over the previous four years has been less than stellar.

When this happens, it is open season for spinning. As we have witnessed in recent months, for the challenger, the spin is that the jobs situation is even worse than it looks. For the incumbent, it is that any weakness is not really the incumbent's fault, that things are not as bad as they seem because there is something wrong with the numbers, and that the jobs outlook is good because corrective actions have been taken and are starting to kick in.

A further opportunity for spinning this year is an apparent shift in the relationship between the two Bureau of Labor Statistics' employment surveys—of payrolls and of total employment.

In recent years, these surveys have moved in reasonable sync, with the employment total about 5% higher than the payroll total because it includes farm workers, the self-employed, and others not included in the payroll count. Over the past four years, however, these surveys have diverged, with payrolls tending down and employment up.

Traditionally, economists and business analysts have considered the payroll data to be more credible and reliable. But the spin now is that the employment data have become the more meaningful because payroll data are

depressed by a trend toward more arm's-length—nonpayroll—relationships between employers and employees. Time will tell.

A look into the job performance of the 14 Administrations since World War II is revealing. When they are ranked by the percentage payroll growth they witnessed, the six Democratic Administrations take six of the top seven spots. Republican Administrations take the fourth spot and the bottom seven. When the measure is growth in total employment, the contrast is not

as stark. But Democrats still take the first and second and four of the top seven spots, and Republicans four of the bottom five.

The 1965–68 Johnson Administration had the best payroll performance, up 16.5%. Carter was second at 13.1%. The second Reagan Administration saw 11.2% growth. Clinton was the champion in absolute numbers with a 23 million payroll boost over his two terms. The current Administration has a firm lock on the 14th and last spot for both payrolls and employment.

There is no firm connection between jobs performance and future political fortunes. Clinton attained the White House in 1992 largely due to a weak economy at the time, and he retained it four years later largely because of a much stronger one. Carter, however, was not reelected in spite of outstanding growth in both payroll and employment during his one term. And Eisenhower and Reagan both won second terms despite lackluster jobs performance in their first term.

THE POLITICAL CONNECTION

Democrats have the edge in creating jobs

RANK BY % CHANGE	ADMINISTRATION	PARTY	BY PAYROLLS CHANGE IN PAYROLLS		NEXT ELECTION
			MILLIONS	PERCENT	
1	Johnson	D	9.8	16.5%	Didn't run
2	Carter	D	10.5	13.1	Lost
3	Truman	D	5.1	11.4	Didn't run
4	Reagan II	R	10.8	11.2	Didn't run
5	Kennedy/Johnson	D	5.7	10.6	Won
6	Clinton I	D	11.6	10.6	Won
7	Clinton II	D	11.4	9.4	Didn't run
8	Nixon	R	6.0	8.7	Won
9	Nixon/Ford	R	5.2	6.9	Lost
10	Reagan I	R	5.2	5.7	Won
11	Eisenhower I	R	2.8	5.5	Won
12	Bush, G. H. W.	R	2.5	2.4	Lost
13	Eisenhower II	R	0.8	1.5	Didn't run
14	Bush, G. W.	R	-0.9	-0.7	?

RANK BY % CHANGE	ADMINISTRATION	PARTY	BY EMPLOYMENT CHANGE IN EMPLOYMENT	
			MILLIONS	PERCENT
1	Carter	D	9.8	10.9%
2	Johnson	D	7.0	10.0
3	Reagan II	R	9.9	9.3
4	Nixon	R	6.6	8.6
5	Nixon/Ford	R	6.4	7.7
6	Clinton II	D	9.7	7.6
7	Clinton I	D	8.9	7.5
8	Reagan I	R	6.6	6.6
9	Kennedy/Johnson	D	4.0	6.1
10	Eisenhower I	R	2.9	4.8
11	Truman	D	2.3	3.8
12	Eisenhower II	R	1.9	2.9
13	Bush, G. H. W.	R	2.9	2.5
14	Bush, G. W.	R	1.8	1.3

NOTE: Data for G. W. Bush are through September 2004.
SOURCE: Bureau of Labor Statistics

The best the chemical community can hope for over the coming 12 months is an end to the deterioration of its job market with, maybe, the first signs of improvement.

Chemists should not get too excited about the recent payroll and employment gains nationwide. This is because 56% of chemists responding to this year's member survey work in manufacturing, the sec-

tor that has borne almost all of the employment decline since 2001.

Payrolls in the manufacturing sector peaked in 1979. Between March 2001 and this September they fell a jarring 2.55 million, or 15%. And with no renewal of growth over the past year—just a bottoming out—losses in manufacturing jobs are largely irretrievable, at least for the foreseeable future.

Employment in the apparently downturn-immune pharmaceutical industry rose from 278,200 in March 2001 to 300,300 this September—an 8% gain. But for the rest of the chemical industry, it has been all downhill, with a dip from 693,500 to 592,100, or almost 15%, over the period. And it's still going down.

It can also be noted that the economy has been growing at a respectable rate of

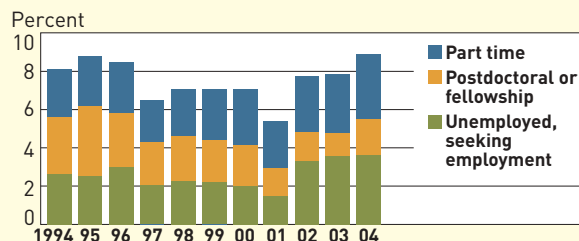
EMPLOYMENT STATUS

Unemployment among chemists has been high for three years, with record high this year

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Employed full time	91.9%	91.1%	91.5%	93.5%	92.9%	92.9%	92.9%	94.6%	92.2%	92.1%	90.9%
Employed part time	2.5	2.7	2.7	2.1	2.5	2.7	3.0	2.5	3.0	3.0	3.6
Postdoc/fellowship	2.9	3.6	2.8	2.3	2.3	2.1	2.1	1.4	1.5	1.4	1.9
Unemployed, seeking employment	2.7	2.6	3.0	2.0	2.3	2.3	2.0	1.5	3.3	3.5	3.6

NOTE: As of March 1 of each year. Based on population that excludes those fully retired or otherwise unemployed and not seeking employment.

SOURCE: ACS's annual salary and employment surveys



EMPLOYMENT OF NEW CHEMISTRY GRADS

Full-time permanent jobs are getting harder to find

	BACHELOR'S			MASTER'S			PH.D.		
	2001	2002	2003	2001	2002	2003	2001	2002	2003
Full-time permanent	31%	26%	24%	49%	38%	41%	45%	45%	37%
Full-time temporary	9	10	9	6	5	6	3	6	5
Part-time permanent	1	1	2	2	1	2	0	0	1
Part-time temporary	3	6	6	4	2	5	1	2	2
Graduate/professional school	47	47	49	33	47	33	—	—	—
Postdoctoral	—	—	—	—	—	—	44	40	51
Not employed/seeking employment	6	6	7	5	5	10	3	5	4
Not employed/not seeking employment	3	5	3	1	3	3	4	3	1

NOTE: As of early October of each year. **SOURCE:** ACS's annual survey of new college graduates

4% or so since the recession, which lasted for only nine months in 2001. However, chemists have of late been slow to respond to economic growth. The job market for chemists remained quite weak during the first four years of the 1993–2000 boom. It became truly strong for only one fleeting year in 2001.

A key indicator from this year's ACS salary and employment survey is the 9.1% of respondents who have other than a full-time job. This is a record high since the surveys were started in their present form more than 30 years ago. The 9.1% is made up of 3.6% employed part time, 1.9% on postdocs or fellowships, and the record 3.6% unemployed but seeking employment.

In 2001, this total was a far more healthy 5.4%. This consisted of 2.5% with part-time jobs, 1.4% on postdocs or fellowships, and the 1.5% unemployed.

The ACS surveys of new chemistry graduates bring out the quite sharp recent decline in the percentage of graduates find-

ing either temporary or permanent full-time jobs. Of the 2001 bachelor's class, 40% accepted such positions. For the 2003 class, this was down to 33%. For master's graduates, the corresponding decline was from 55% to 47%, and for Ph.D. graduates, from 48% to 42%.

This year's salary and employment survey also brings out the evolving profile of the workplace for ACS chemist members, especially the shift toward pharmaceuti-

INDUSTRIAL EMPLOYERS

New graduates are more likely to work for smaller firms

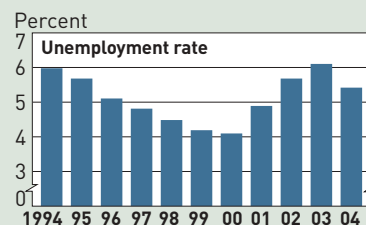
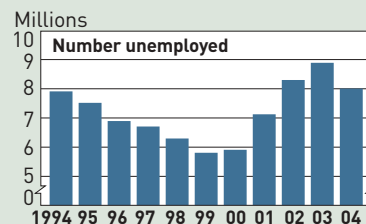
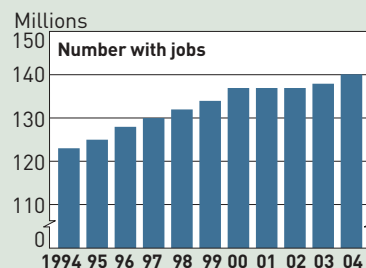
NUMBER OF EMPLOYEES	WORKING CHEMISTS	NEW GRADUATES
Up to 99	16%	29%
100 to 499	14	22
500 to 2,499	14	17
2,500 to 9,999	16	10
10,000 or more	40	22

SOURCES: ACS's 2004 salary and employment survey, ACS's 2004 survey of new college graduates

icals and away from chemicals. Of respondents under 40 years of age, 32.6% work for pharmaceutical and related concerns and 14.7% for chemical and related concerns. Of respondents over age 40, substantially fewer, 19.1%, are in pharmaceuticals and relatively more, 17.8%, are in chemicals.

U.S. EMPLOYMENT

Job market finally starts to improve after four weak years



NOTE: Data are as of September of each year. **SOURCE:** Bureau of Labor Statistics

WHERE THE JOBS ARE FOR CHEMISTS IN 2004

Younger chemists are more likely to work in the pharmaceutical industry

PERCENTAGE AT ALL DEGREE LEVELS WITH FULL-TIME JOBS	UNDER AGE 40	40+	ALL
MANUFACTURING	60.0%	53.9%	55.8%
Chemical & related	14.7	17.8	16.9
Pharmaceutical & related	32.6	19.1	23.2
Other manufacturing	12.7	17.0	15.7
ACADEMIA	21.4	24.9	23.9
Universities & four-year colleges	17.1	18.8	18.3
Medical & professional schools	1.6	2.1	1.9
Two-year colleges	0.9	2.0	1.7
Secondary schools & other	1.8	2.1	2.0
NONMANUFACTURING/NONACADEMIA	18.7	21.2	20.4
Analytical & research services	11.9	8.0	9.2
Government	4.5	8.6	7.4
Self-employed	0.2	1.3	0.9
Other	2.0	3.3	2.9

NOTE: As of March 1, 2004. SOURCE: ACS's 2004 salary and employment survey

Other significant differences include 11.9% of younger chemists and a much lower 8.0% of older chemists working in analytical/research services and 4.5% of younger chemists and 8.6% of older chemists being in government service.

Another evolving shift is in the size of the employers that chemists work for. The 2004 salary survey indicates that 40% of ACS members who are industrial chemists are employed by companies with 10,000 or more employees and 16% by firms with fewer than 100 employees. The starting salary survey indicates that only 22% of the 2003 graduates with full-time jobs found them in 10,000-plus employee organizations while 29% found them in the fewer than 100 employee category.

Responses to the salary and employment survey question that asks for salaries as of March 1 in both the cur-

SALARIES OF CHEMISTS

Younger workers get larger raises than older

\$ THOUSANDS	MEDIAN SALARY		2003-04 INCREASE	
	2003	2004	AMOUNT	%
ALL CHEMISTS	\$83.4	\$87.0	\$3.6	4.3%
BY DEGREE				
Bachelor's	64.9	67.8	2.9	4.5
Master's	73.7	76.8	3.1	4.2
Ph.D.	92.4	96.4	3.9	4.3
BY EMPLOYER				
Business/industry	88.4	92.2	3.8	4.4
Academia	70.3	73.0	2.7	3.9
Government	82.5	86.1	3.6	4.4
BY GENDER				
Men	87.8	91.4	3.6	4.2
Women	70.3	73.8	3.5	4.9
BY ETHNICITY				
Hispanic	73.8	77.3	3.5	4.8
Non-Hispanic	83.7	87.3	3.6	4.3
BY RACE				
Asian	81.7	85.6	3.9	4.7
Black	70.7	73.7	3.0	4.2
White	84.1	87.7	3.6	4.3
BY CITIZENSHIP				
Native born	83.2	86.7	3.5	4.2
Naturalized	88.7	92.5	3.8	4.3
Permanent resident	85.3	89.6	4.4	5.1
Other visa	68.6	72.6	4.0	5.8
BY AGE				
20-29	47.8	50.8	3.0	6.2
30-39	68.0	71.7	3.7	5.4
40-49	85.9	89.8	3.9	4.5
50-59	94.7	98.3	3.6	3.8
60-69	96.5	99.5	3.0	3.1

NOTE: As of March 1 of each year for chemists with full-time jobs as of both dates. SOURCE: ACS's 2004 salary and employment survey

MEDIAN SALARIES

For all chemists employed full time, as a group, 2003-04 pay gain comfortably exceeds rate of inflation

\$ THOUSANDS	1994	2003	2004	ANNUAL CHANGE	
				2003-04	1994-2004
ALL CHEMISTS	\$57.9	\$80.0	\$82.0	2.5%	3.5%
BY GENDER					
Men	60.0	84.5	86.0	1.8	3.7
Women	45.2	65.7	67.0	2.0	4.0
BY HIGHEST DEGREE					
Bachelor's	44.3	59.7	62.0	3.9	3.4
Master's	52.0	71.3	72.3	1.4	3.4
Ph.D.	65.0	90.0	91.6	1.8	3.5
BY EMPLOYER					
Industry	60.0	86.0	88.0	2.3	3.9
Government	56.0	77.0	85.0	10.4	4.3
Academia	50.1	63.0	62.0	-1.6	2.1
BY DEGREE & EMPLOYER					
Bachelor's					
Industry	45.0	60.0	63.0	5.0	3.4
Government	45.3	58.2	58.7	0.9	2.6
Academia	31.5	45.0	36.6	-18.7	1.5
Master's					
Industry	55.0	76.5	76.0	-0.7	3.3
Government	52.4	65.8	74.5	13.2	3.6
Academia	39.0	52.1	50.1	-3.8	2.5
Ph.D.					
Industry	70.0	98.0	100.0	2.0	3.6
Government	64.0	91.0	95.0	4.4	4.0
Academia	52.0	65.4	65.1	-0.5	2.3
Consumer Price Index for all urban consumers					
	147.2	184.2	187.4	1.7%	2.4%

NOTE: Medians are base annual salaries for chemists with full-time jobs as of March 1 of each year. They are derived from the surveys for each year and so represent year-to-year changes for the entire profession as a group. These changes understate increases for chemists as individuals. SOURCES: ACS's annual salary and employment surveys, Bureau of Labor Statistics (Consumer Price Index, 1982-84 = 100)

STARTING SALARIES BY WORK EXPERIENCE

2003 was second year of little or no salary gain for new chemistry graduates

\$ THOUSANDS	BACHELOR'S			MASTER'S			PH.D.		
	2001	2002	2003	2001	2002	2003	2001	2002	2003
Fewer than 12 months	\$32.2	\$31.0	\$32.0	\$43.0	\$45.0	\$44.5	\$69.5	\$67.5	\$63.3
12-36 months	36.0	34.1	35.0	49.1	41.0	45.0	63.0	65.0	72.5
More than 36 months	36.7	40.0	39.0	50.0	55.0	54.0	74.0	70.0	77.5
ALL NEW GRADUATES	\$33.6	\$32.8	\$33.0	\$48.0	\$50.0	\$48.0	\$70.0	\$68.0	\$68.5

NOTE: Median salaries as of early October of each year. SOURCE: ACS's annual surveys of new chemistry graduates

SALARY GAINS

Raises are getting harder to come by ...

PERCENTAGE WHO RECEIVED A RAISE	2001	2002	2003	2004
ALL CHEMISTS	87%	85%	81%	81%

BY DEGREE	2001	2002	2003	2004
Bachelor's	85	82	83	81
Master's	86	84	82	82
Ph.D.	88	86	80	81

BY EMPLOYER	2001	2002	2003	2004
Business/industry	87	85	81	83
Academia	88	86	80	74
Government/other	86	90	92	87

... and they are smaller as well

MEDIAN INCREASE	2001	2002	2003	2004
ALL CHEMISTS	4.9%	4.8%	4.2%	4.0%

BY DEGREE	2001	2002	2003	2004
Bachelor's	5.0	4.9	4.4	4.2
Master's	4.9	4.8	4.2	3.9
Ph.D.	4.8	4.8	4.1	4.0

BY EMPLOYER	2001	2002	2003	2004
Business/industry	5.1	5.0	4.3	4.0
Academia	4.3	4.2	3.8	4.0
Government/other	4.3	4.9	4.0	3.5

NOTE: Median percent salary increases from March 1 to March 1 of succeeding years for individual chemists who were employed full time by the same employer for the period. SOURCE: ACS's salary and employment surveys

rent year and the previous year yield the most meaningful and consistent data on salary gains for chemists as individuals. This is because the data for both years come from the same set of respondents to the same survey. Also, the median year-to-year increases obtained this way include gains stemming from growing experience and responsibilities as well as from promotions.

The latest median raises determined this way for chemist respondents were in the 4 to 5% range for almost all subsets of the profession. For instance, it was 4.2% for men and 4.9% for women. The only real divergence is by age. The increases drop steadily from 6.2% for

20- to 29-year-olds to 3.1% for 60- to 69-year-olds. For chemists who stay with the same employer, there has been a decline in the percentage receiving raises from 87% in 2001 to 81% in 2004. And the median annual salary increase for those receiving one has slipped from 4.9% in 2001 to 4.0% this year. Salary gains for working chemists from 2003 to 2004 obtained by comparing the data from the surveys taken each year need to be interpreted carefully. First, they measure the gains for chemists as a group, not as individuals. As such, they largely reflect inflation. Second, year-to-year salary gains determined as the difference between two much larger numbers, the actual salaries obtained from two surveys taken a year apart and with different member samples, tend to be irregular, especially for subgroups. For instance, the 2003-04 salary increase measured this way for government chemists was a not credible 10.4%

SALARY GROWTH

Salaries of both new graduates and working chemists have been growing at about 3.5% per year

\$ THOUSANDS	WORKING CHEMISTS			NEW GRADUATES		
	BACHELOR'S	MASTER'S	PH.D.	BACHELOR'S	MASTER'S	PH.D.
1994	\$44.3	\$52.0	\$65.0	\$24.0	\$30.8	\$48.0
1995	45.4	53.5	66.0	25.0	36.0	50.0
1996	45.0	53.6	68.0	25.0	34.1	45.0
1997	49.4	56.2	71.0	28.0	37.5	54.0
1998	49.6	57.7	73.3	29.5	38.5	59.3
1999	50.1	61.0	76.0	30.0	42.0	61.0
2000	53.1	62.0	79.0	33.5	41.1	64.5
2001	55.0	65.0	82.2	32.2	43.0	69.5
2002	58.0	68.5	85.2	31.0	45.0	67.5
2003	59.7	71.3	90.0	32.0	44.5	63.3
2004	62.0	72.3	91.6	—	—	—
AVERAGE ANNUAL GAIN (1994-2004)	3.4%	3.4%	3.5%	3.3%	4.2%	3.1%

NOTE: Median annual salaries for working chemists with full-time jobs as of March 1 of each year and of new chemistry graduates with full-time jobs as of October of each year. SOURCES: ACS's annual salary and employment survey, ACS's annual survey of new chemistry graduates

The two annual ACS salary and employment surveys are under the purview of the ACS Committee on Economic & Professional Affairs.

Since 1996, the member survey has been conducted by Mary W. Jordan, workforce program specialist for the ACS Office of Member Information.

The year's survey is based on questionnaires mailed to a sample of 30,000 of the approximately 90,000 society members who reside in the U.S.; are under 70 years of age; and are not in the emeritus, retired, or student member categories. There were 11,600 responses, of which 10,200 were from chemists in the domestic workforce.

The latest starting salary survey was conducted by Janel Kasper-Wolfe, workforce research associate for the same office. This year, it was based on a questionnaire sent to almost 8,900 graduates at all three degree levels. A further 1,760 questionnaires were sent to chemical engineering graduates. The total response was 3,500, including 3,000 from chemists. ■