

# CHEMICAL PROCESSING

LEADERSHIP | EXPERTISE | INNOVATION



**CHEMICAL  
INDUSTRY SALARIES  
CONTINUE TO RISE**



# CHEMICAL INDUSTRY SALARIES CONTINUE TO RISE

*Annual survey reveals continued positive job outlook and earnings despite a dip in hiring.*

By Amanda Joshi, Managing Editor

“Each job in the chemical manufacturing sector supports more than six jobs in other parts of the economy,” said Martha Gilchrist Moore, chief economist of the American Chemistry Council (ACC) during her mid-year State of the Industry report for *Chemical Processing*. “So, ... the industry is supporting jobs in local communities around the country, and part of that is [due to ] the above-average wages that the industry pays.”

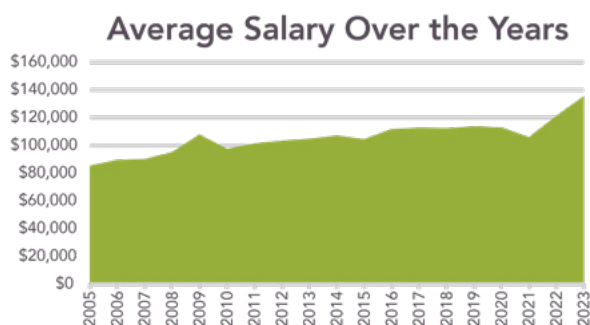
In fact, the [U.S. Bureau of Labor Statistics](#) reported the median annual wage for chemical engineers as of May 2023 (the latest available data) was \$112,100. However, some participants of our annual Job Satisfaction and Salary Survey said that number is too low. "... A large part of my team's compensation was \$185,000 or more, with several over \$200,000 plus equity bonus," shared one respondent.

jump from \$121,500 in 2022 (Figure 1). In addition, our average sits between the Bureau's conservative number and the American Institute of Chemical Engineers' (AIChE) biannual survey [reporting](#) salaries of its members averaging \$150,000 in 2023.

In addition to the increase in average salary, the average bonus also rose. Since 2021, the average bonus has increased by at least \$1,000 each year. For 2024, the average bonus fell slightly short of this trend at \$9,351, still up from \$8,415 last year. Of those who received bonuses, more than half of our respondents took home more than \$10,000, an 8% jump from 2023's 46% (Figure 2) and well ahead of the 37% that stood in this bracket in 2022.

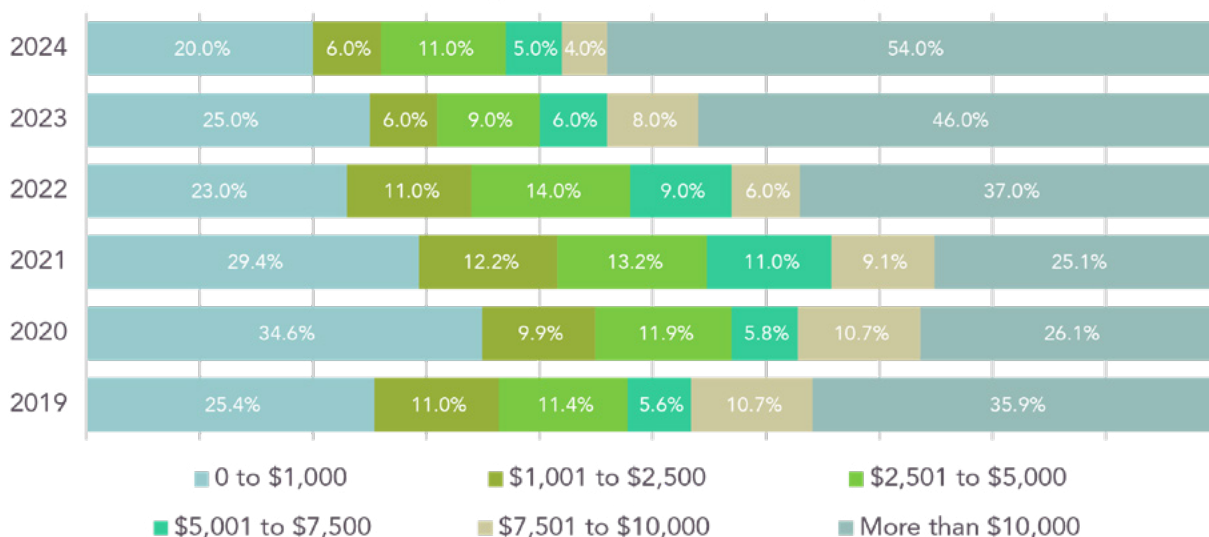
(For context, year to year, we typically see no more than a 2%–3% variation in any particular response to salary survey questions. Any larger differentiation is notable and worth reporting here.)

As a result, our respondents report an average salary of \$137,000 this year — a gradual rise from the \$135,000 average for 2023 following a larger

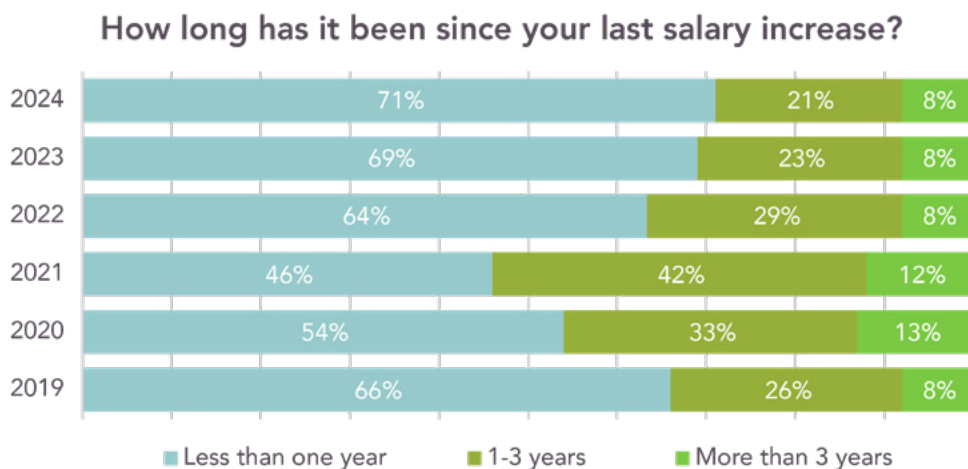


**Figure 1.** The average salary rose slightly from 2023's \$135,000 to \$137,000 in 2024.

## How much did you earn annually in bonuses?



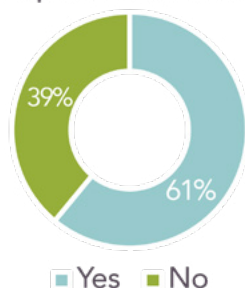
**Figure 2.** More than half of our respondents reported bonuses exceeding \$10,000 this year.



**Figure 3.** The majority of respondents report receiving an annual pay increase.

While more than 70% of respondents report receiving a pay increase within the last year (Figure 3), and 10% more disclosed receiving raises between 2.5% and 5%, the average raise fell slightly from 4.85% last year to 4.3% for 2024. While data show this number likely should be higher, the dip could be attributed to fewer total respondents compared to last year, which skews the calculations. (It's worth noting that all other data falls in line with previous years' responses despite a dip in the number of survey participants.)

In your opinion, are you adequately compensated for your experience level and skills?



**Figure 4.** Just as in 2023, more than half of respondents feel their experience matches their compensation.

More than half of respondents (61%) also shared that their compensation this year adequately matches their experience and skill level (Figure 4).

"Compensation at my level is great for my years of experience and knowledge base. I've been given an opportunity to grow into my current position so my compensation reflects that well," shared one respondent.

"I thought a 24% increase in compensation last year would motivate me, but instead it made me bitter that I had been undercompensated for so long."

"Elevated and sustained compensation isn't the result of a single move/promotion but is the result of continually adding value to the organization and team. Like interest, it compounds," explained one respondent about his thoughts on his compensation.

"I am grateful for the compensation and benefits provided by my employer," shared another.

“My compensation is currently satisfactory, but I am keeping my eyes open to the market moves,” said another.

“My company compensates employees heavily based on company and individual performance (almost 30% of compensation is variable), which encourages us to work more efficiently.”

Alternatively, 39% have the opposite view, with a few survey participants voicing their dissatisfaction with their compensation.

“I thought a 24% increase in compensation last year would motivate me, but instead it made me bitter that I had been undercompensated for so long,” noted one respondent.

“I am slightly underpaid for my responsibility level. Would like more vacation,” said another contributor.

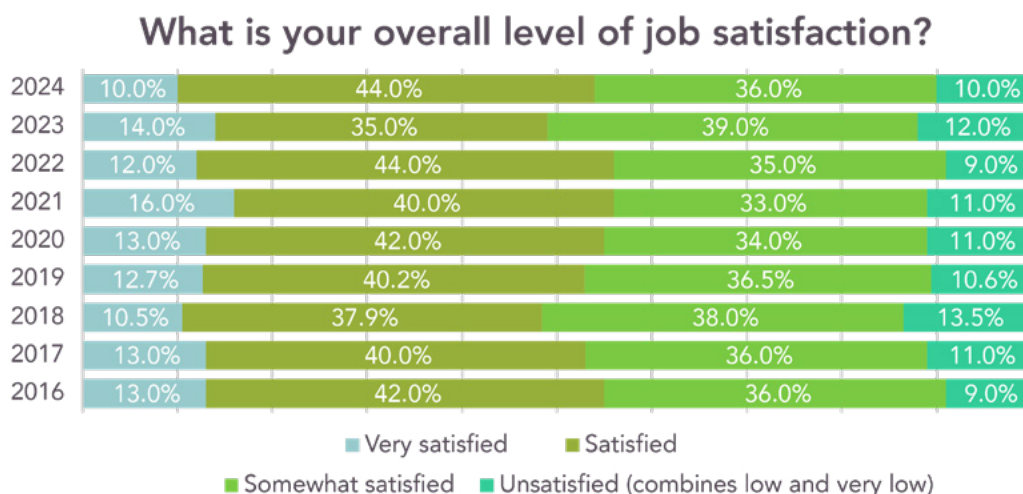
“[My compensation] seems low for someone with my experience, responsibility and performance rating,” shared another.

## JOB SATISFACTION AND MORE

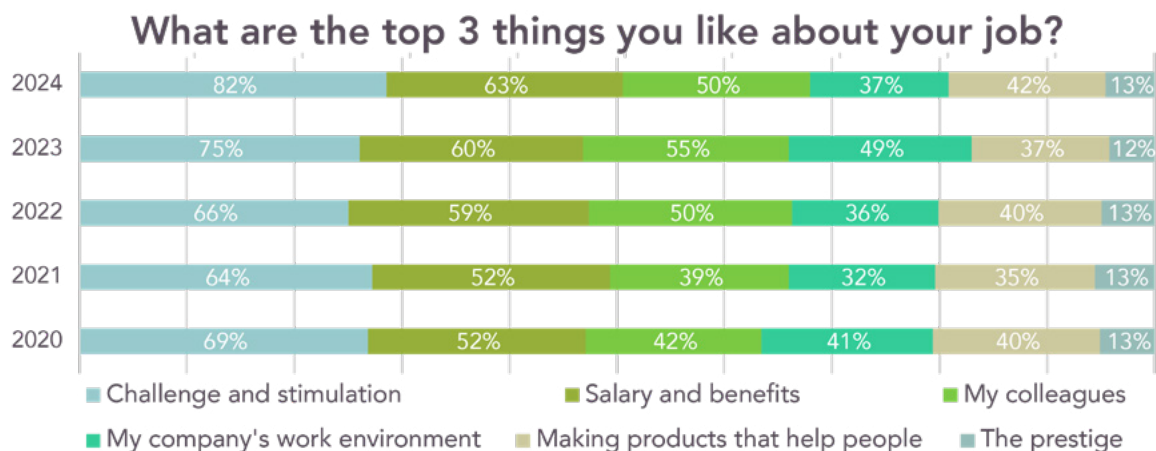
Despite some grumblings regarding compensation, overall job satisfaction is 90% (Figure 5). Many respondents say the positive work environment and challenging roles keep them satisfied and motivated in their careers. Nearly 82% of respondents shared the challenge and stimulation as one of the top 3 things they like about their job (Figure 6).

The following response samples provide some insight into current attitudes:

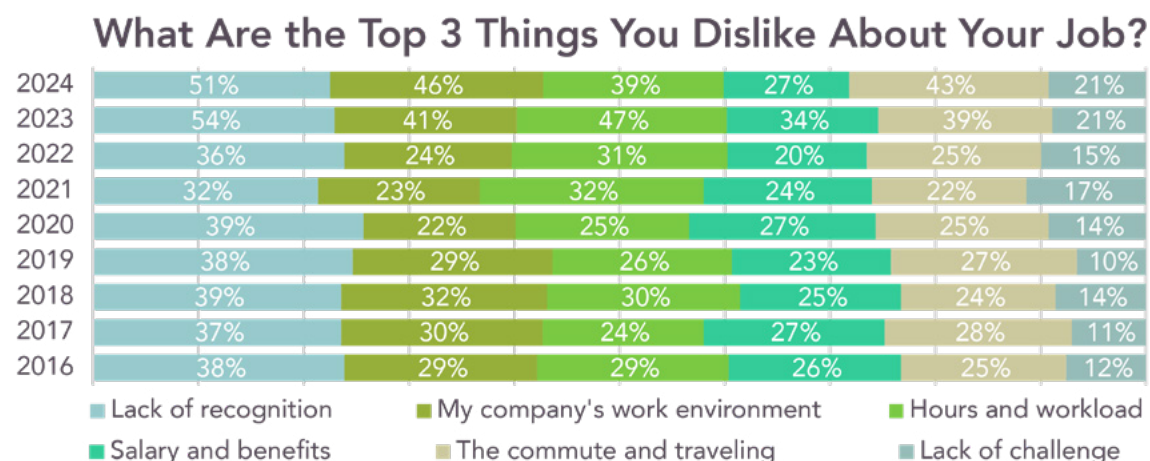
- “The job I have now matches the skillset I’ve built up over my career very well. There are a lot of challenging issues to work on, and I can readily see the results of my work.”
- “I like improving things and fixing problems, which makes my job even easier through better reliability, improved product quality and less reactive work, while making step changes in safety performance and environmental compliance.”
- “Learning new things every day is what keeps me engaged and motivated.”



**Figure 5.** More than half of respondents (54%) are satisfied with their jobs, and another 36% said they’re “somewhat satisfied.”



**Figure 6.** Challenge and stimulation rank highest in job satisfaction, followed by salary and benefits.



**Figure 7.** Surprisingly, the hours and workload didn't make it into the top 3 dislikes as seen in past years. Instead, moving up the list was the commute and traveling. Most respondents commiserated with the lack of recognition and the work environment.

Rounding out the top three, more than half (63%) touted the salary and benefits and 50% said their colleagues were key drivers of job satisfaction.

"I like what I do and the people I work with. No backstabbing that I'm aware of," shared one participant.

In fact, we asked what motivates participants in their career, and many responded that their colleagues keep them happy.

"What motivates me is when there are small wins, and on the occasion a site reinforces

fundamentals, basic programs and procedures. And when a site truly works together, regardless of what 'hat' they wear when they walk through the gate," shared another.

No job is perfect, so topping the dislikes – as in years past – is the lack of recognition, with 51% of respondents sharing this as the main detractor. Also echoing last year, the work environment took second with 46% dissatisfied with their workplace.

"Pay is fine since the work is easy. I get paid for dealing with coworkers," shared another.

“Too much work to do and too few people to do it,” commented one survey participant.

“[My compensation is] well below average for my job function and the amount of work I have to do. Team of 1, should be a team of 3–4,” said one contributor.

Usually, our respondents consider the “hours and workload” in the top three dislikes, but this year, it dropped to fourth place as more employees (43%) lamented about “the commute and traveling” (Figure 7). While some companies have adopted hybrid schedules and allowed remote work since the pandemic, it’s become evident more firms are demanding workers return to the office.

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## JOB SATISFACTION OVER THE YEARS

Chemical Processing has been conducting its annual salary and job satisfaction survey for nearly 20 years.

[Take a look back at past surveys.](#)

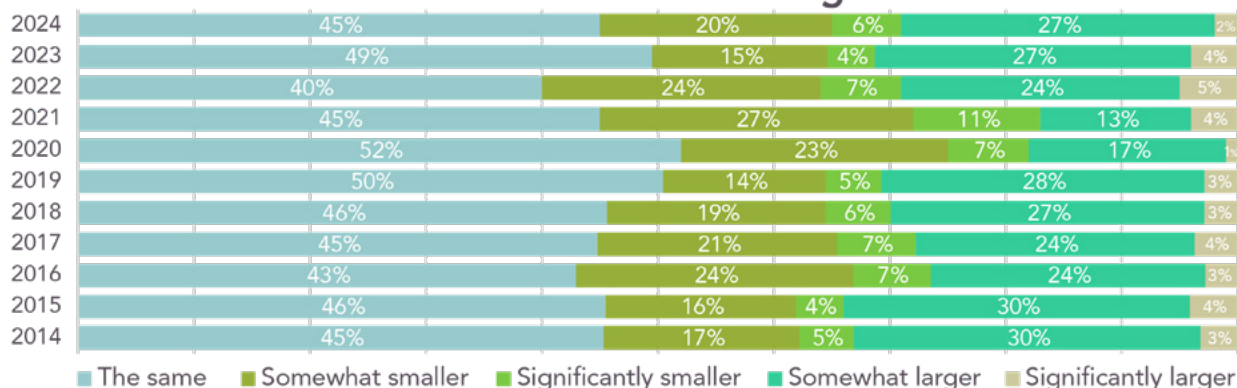
## WHAT ABOUT HIRING?

“It’s challenging to maintain fair compensation as your career progresses unless you are willing to change companies or take on leadership roles,” shared one survey participant.

“Stay aware of your value in the marketplace. Jumping companies continues to generally be the best pathway for compensation increases,” added another.

The U.S. Bureau of Labor expects employment of chemical engineers to grow 10% within the next 10 years, much faster than the average for all occupations.

## What Is the Professional Staffing Level At Your Site Now Versus 12 Months Ago?



**Figure 8.** Hiring seems to have stalled a bit, with some job losses indicated as well. Respondents reporting larger staffs decreased 2% from last year, while those noting a somewhat smaller or significantly smaller workforce rose 7%.



Furthermore, about 1,400 openings for chemical engineers are projected each year, on average, through 2033. Many of those openings will likely result from the need to replace workers who transfer to different occupations or retire, according to the Bureau.

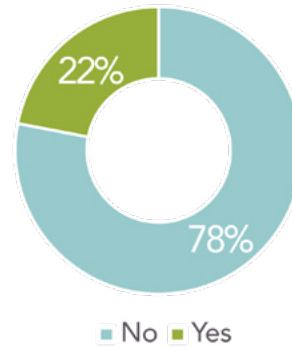
However, in *Chemical Processing's* 2024 mid-year State of the Industry report, ACC's Moore revealed the job forecast indicates a slight decline in overall employment levels in the chemical industry in 2024.

"We did see a slight decline in 2023, but that followed years of strong builds," she stated. "It's not unique to the chemical industry. Labor was hard to find for a very long time. We're still in a relatively tight labor market. So many employers are trying to hold on to those employees, even though we've seen the downturn in the industry."

While 27% of respondents indicate that staffing levels are significantly higher than a year ago — the same percentage reporting a prior-year increase in last year's survey — the number of respondents

disclosing significantly smaller or somewhat smaller workforces increased by 7%. In addition, those revealing staffing levels held steady from year-to-year dropped 4% (Figure 8).

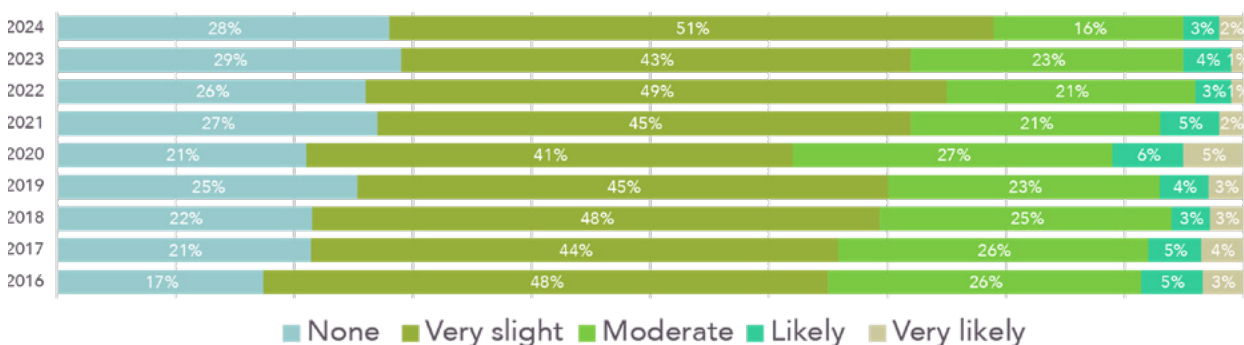
### Are You Concerned About Job Security?



**Figure 9.** Despite the lower staffing levels, nearly 80% of respondents shared they aren't concerned about potential job loss.

Despite this slight downward trend in staffing levels, 78% of our respondents say they aren't worried about job security (Figure 9), a 7% jump from 2023 and is the lowest level of job security concerns ever recorded in our annual survey. In addition, nearly 80% of respondents say they believe the chances they'll be laid off or fired within the next two years is slim (Figure 10) and only 16% (23% in 2023) say chances are "moderate."

### What Are the Chances You Will Be Laid Off Or Fired Within the Next Two Years?



**Figure 10.** Nearly 80% of respondents say the likelihood of losing their job is slim.



One survey participant, when asked to give advice to those considering a career in the chemical industry, said, “Do it. If it gets boring,

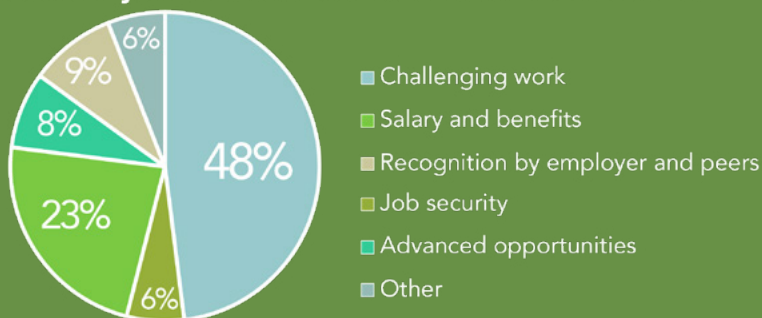
there are a lot of different industries that utilize chemical processes. The pay is generally decent, and jobs are plentiful.”

## ***THANK YOU***

A special thank you to all those who participated in our survey for 2024. We appreciate you taking the time to provide us with quality data and comments that shed light on industry workforce conditions. We could not have put this together without your valuable insight.

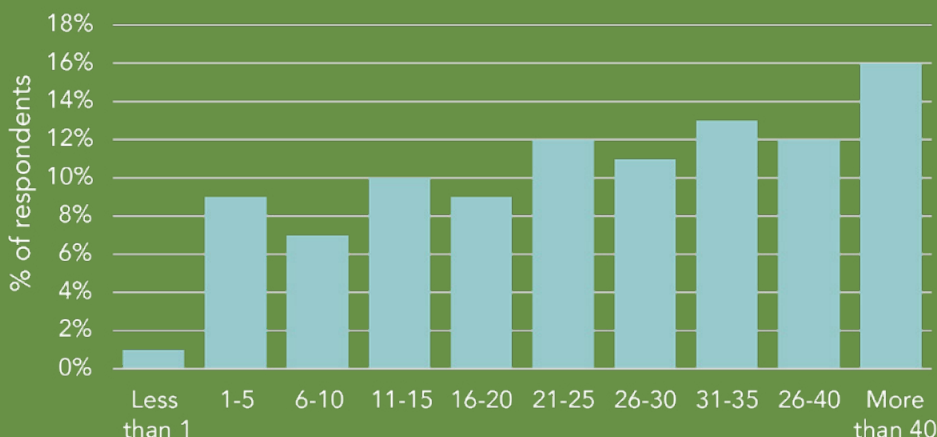
# MORE FROM SURVEY PARTICIPANTS

What *single* factor contributes most to your overall job satisfaction or dissatisfaction?



**Figure 11.** A consistent response over the years, challenging work ranks highest in overall job satisfaction.

How many years have you worked in the field?



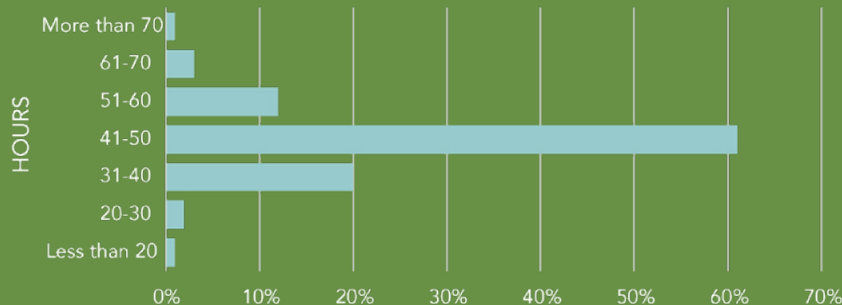
**Figure 12.** Similar to last year, more than 40% say they have been in the industrial field for 31+ years.

## ARE YOU WORKING LONG HOURS?

“If you want to get to the top, put in the hours and continuously learn.”

More than half of respondents work between 41 and 50 hours a week, with another 16% reporting they work overtime (Figure 13). And, as in previous years, the top reason to work overtime is to get work done. However, advancing their careers bumped to third with more noting they use the opportunity to earn extra money (Figure 14).

### How many hours, on average, do you work each week?



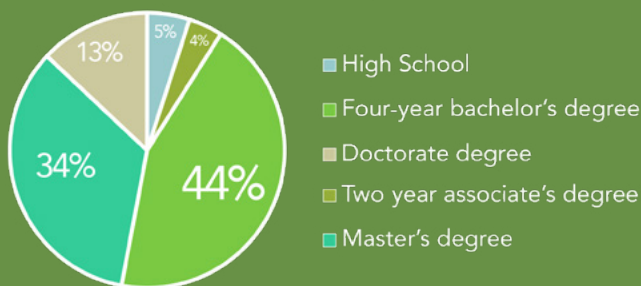
**Figure 13.** The bulk of respondents (77%) work full-time or clock longer hours.

### If you work overtime or extra hours, what is the main reason?

**Figure 14.** The majority work overtime to get their work done, but a few noted the extra hours are to supplement their salaries.



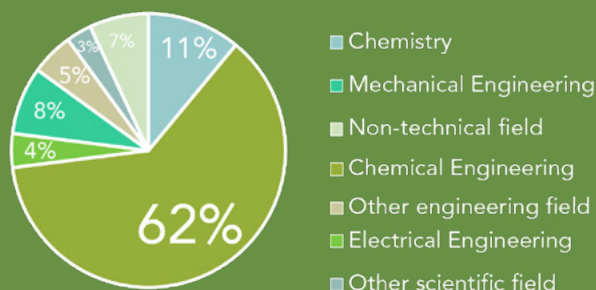
### What is the highest level of education you have completed? (pie chart can be found in PDF)



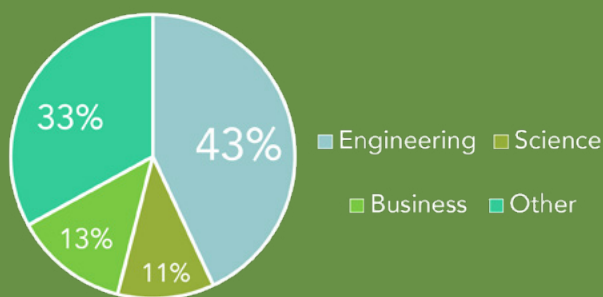
**Figure 15.** Nearly half of respondents (47%) have postgraduate degrees.

### What best defines your major field of study?

**Figure 16.** Of those with degrees, 62% defined their field of study as chemical engineering.



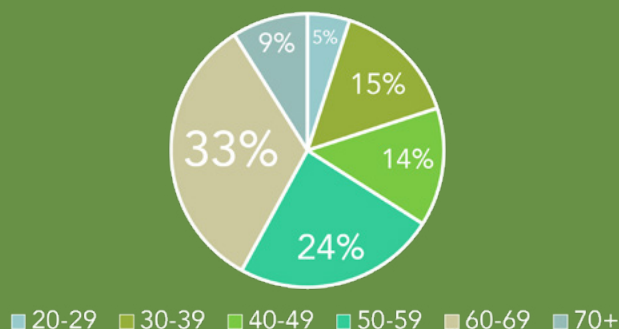
### If you have a graduate degree, what field is it in?



**Figure 17.** Of those with graduate degrees, nearly half focus on engineering.

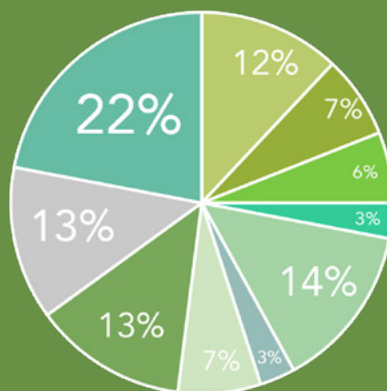
### What age group are you in?

**Figure 18.** More than half of respondents (66%) are over the age of 50, and more than a third of those respondents are in the 60-69 age range.



### In which industrial sector do you work?

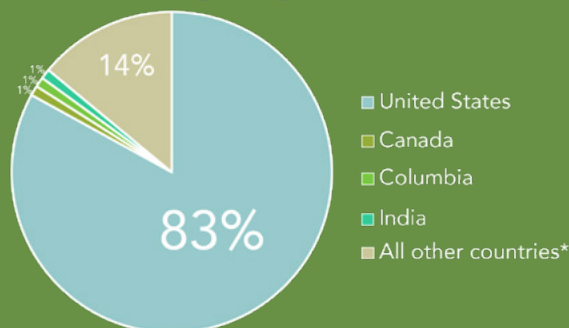
- Industrial inorganic chemicals
- Pharmaceuticals
- Industrial organic chemicals
- Miscellaneous chemical products
- Engineering, construction and consulting
- Plastics or synthetic fibers
- Soap, cosmetics and related products
- Agricultural chemicals
- Petroleum refining and related products
- Other



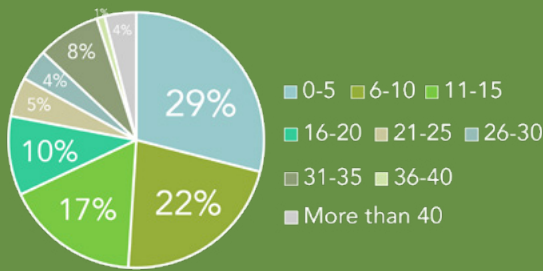
**Figure 19.** The chemical industry is so broad, 22% of respondents didn't fit within the categories we provided. Of those categories listed, most work with industrial organic chemicals, ECC, and petroleum and refining industries.

### What country do you work in?

**Figure 20.** The majority of our respondents are based in the United States.



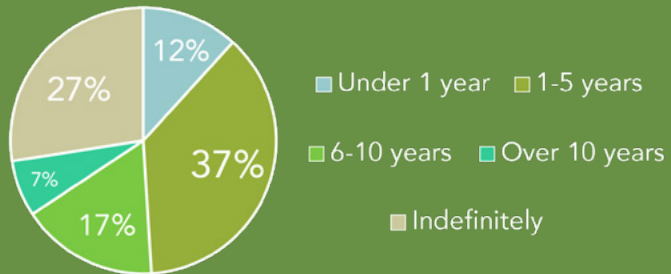
### How many years have you been with your current employer?



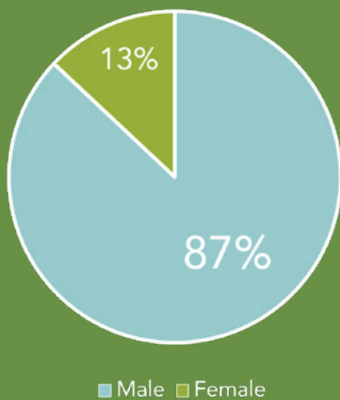
**Figure 21.** More than half of respondents have been with their company less than 10 years.

### How long do you intend to stay with your current employer?

**Figure 22.** While 50% of respondents plan to stay with their employer 5 years or less, more than a quarter of respondents expect to stay 'indefinitely' with their employer.

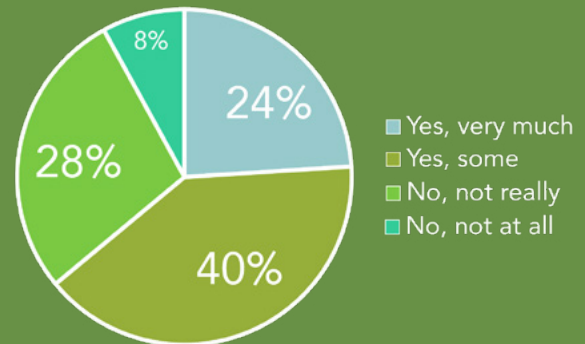


### What is your gender?



**Figure 23.**

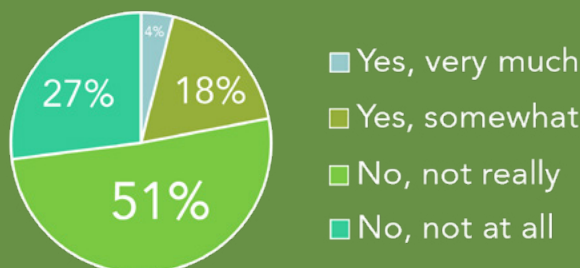
### Does your employer help you in balancing work and life?



**Figure 24.** Nearly 65% say their employers encourage a work-life balance.

### Does/Would a negative public perception of the chemical industry impact your job satisfaction?

**Figure 25.** More than half of respondents say they are unbothered by negative industry perception.



# CAREER ADVICE

Each year, we ask “What single piece of advice would you give someone who is thinking of going into the field?” Respondents often suggest that chemical engineering majors must be flexible, work hard, study hard, persevere and always be willing to learn new things. As one commenter said, “Do it! The field is so broad, and it is almost impossible to be unhappy if you are willing to search for what you like.”

Engineers in the field shared numerous other nuggets of career advice for potential newcomers, even suggesting fields to avoid or questioning the need for a postgraduate degree. Here are some of their comments.

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*Think more broadly. Even if you studied a specific field, learn about the rest of the business, such as finance, engineering, supply chain, quality and regulatory.*

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*It's a really important field (feeding the nation and others); research potential employers carefully.*

---

*Know that jobs are concentrated in certain geographical regions.*

---

*If advancement opportunities or salary is lacking, change jobs if possible.*

---

*Make sure the company's goals are aligned with your ideologies. Feel good about the work you contribute to. Enjoy what you study in college so you know you will enjoy the day-to-day work in the industry.*

---

*Crosstrain in AI and cybersecurity, since these will significantly affect chemical engineering activities now and even more in future.*

---

*Be prepared for job and career changes, both for advancement opportunities as well as from factors outside of your control.*

---

*Don't chase the money; chase the opportunities.*

---

*ChemEs who don't go into a leadership role are severely limited.*

---

*Take advantage of experiences outside of the traditional pathway within the company.*

---

*Get as much experience as possible; try to get government employment.*

---

*Don't settle.*

---

*Make contacts, and stay engaged with what you do every day.*

---

*Always be prepared to contribute.*

---

*(1) Do what you love to do and do not choose a profession solely on salary potential. (2) Look for certifications, licenses or other types of training that you can use to document what you know, and use it to differentiate you from other potential candidates. (3) Be willing to accept roles that contribute to making you a well-rounded employee. Many times, people build their skillset around a specific area, and this often leads them to be a "One Trick Pony."*

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*Learn about basics including fundamentals, such as science and math. Continue to learn and improve each day.*

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*I think someone summarized it best when I was a young engineer ... If you go into engineering, you'll be comfortable, but you won't be rich.*

---

*Continue learning because your degree is just a starting point in chemical engineering.*

---

*Work hard and always ask questions and LISTEN. Other people in your company know things; let them teach you.*

---

*Just be prepared to be villainized by well-intended but uninformed members of the public and possibly your family who see manufacturing as bad and leading to pollution and contributing to global warming.*

---

*Stay humble. You don't know it all when you graduate from university; you won't know it all when you're at the end of your career. Everyone you meet knows something you don't. Open yourself up to criticism and use it to get better. The most successful engineers I've worked with have been confident in what they know but never too proud to admit that their assumptions were wrong or their understanding incomplete.*

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*Don't buy into the hype about man-made climate change (the oil and gas industry is a great industry to work in).*

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*Don't hesitate to work on the plant floor or in the lab making product or prototypes. Project management is only a good place when there are more projects than leaders.*

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*Although technical knowledge through education is important, learning to work with others, communication and influence are major factors in career success.*

---

*When starting out, request to be on shift with operators for several months to understand the process, day-to-day operational challenges and tasks.*

---

*Your ability to function in a corporate environment is as important to your success as your technical skills.*

---

*Stay in ChE and not EHS.*

---

*Stay away from small companies in rural America.*

---

*Do a co-op and get as much cross-training as possible.*

---

*Learn the fundamentals, and then never stop learning.*

---

*Choose your career path based on your interests and values, not just based on salary.*

---

*Chemical engineering is a good field to be in. I've never lacked job opportunities.*

---

*Engineering work involves more administrative tasks than science/engineering.*

---

*Try many experiences to gain skill and versatility.*

---

*Start in a production environment; then you can branch into any role.*

---

---

*Learn everything you can about as many fields that you can.*

---

*Do it. If it gets boring, there are a lot of different industries that utilize chemical processes. The pay is generally decent, and jobs are plentiful.*

---

*Understand it will take a long time to commercialize a technology. It will take 10 years for you to become successful in this field.*

---

*This is a chance to make a difference, but your heart has to be in it. Don't do it for the money.*

---

*Do not be afraid to learn and accept new challenges. This may mean moving to a different state or country.*

---

*Do it. The world needs more engineers to solve the world's problems.*

---

*To prepare, get as many certifications in related fields after obtaining a university degree.*

---

*If getting a college degree, make sure it is a BS in a STEM subject; otherwise, it is a waste of money.*

---

*Be humble and work harder than you think is necessary; be a sponge and learn from anyone who'll inform you.*

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*Do more than you are asked for, deliver always, don't complain. Also focus on your career, keep learning, ask for what you are worth, and don't be afraid to move to a company that is a better fit (compensation is not everything, but it is important). The company will not hesitate to release you if you are not a fit (even mildly not a fit).*

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*The challenges in the chemical industry due to environmental factors are not aligned with the business balance sheet. The chemical industry is high capital, high skill, low margin like a commodity business.*

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*Your most important job is the job you are currently performing.*

---

*Have an open mind to learn from people and processes, respect people with experience, have resilience for the challenges, make open questions to leaders to clarify expectations, have accountability for your actions and look ahead to where you want to go (career ladder); identify people that could be good mentors. Avoid traps of complaining and being negative.*

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*Make yourself indispensable.*

---

*Remember all the basic science you learned, and don't dismiss factors outside the focus of your research.*

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*Find success in what you do to make the job better for everyone.*

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*The future is bright with all the opportunities and challenges for chemical engineers. Some of the headwinds, such as interest rates and real estate prices, are playing a much larger role in career decisions, and these factors may be in play for quite some time.*

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*Try out a lot of roles when you are starting. It's much easier to shift early on than later.*

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*Before going into consulting or EPC work, try to have some experience in operations. It is invaluable.*

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*Run to something with more growth potential.*

---

*Make certain you are disciplined enough to work independently, and be a creative problem solver.*

---

*Recognize that industry is very fluid, dynamic and thus challenging and never boring!*

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*Do the best job that you can, and don't be bullied.*

---

*The future will not be the same as the past — jobs will change, perhaps many times in your career.*

---

*Be prepared to wear many hats.*

---

*Don't be afraid to ask questions. You don't have to have all the answers.*

---

*Have advance technology knowledge.*

---

*Do some self-reflection, and think about if you want to be at a desk all day or if you want some flexibility to get out and tinker with things.*

---

*Beware, the EPA is trying to eliminate the chemical and power industry.*

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*Environmental concerns are shifting the job market. Be ready to perform in a fulfilling role but change jobs on a 7-year basis.*

---

*Stick to the production side. AI will wipe out all of the admin jobs soon.*

---

*Be prepared to spend time learning in this market and its customer base.*

---

*Your job satisfaction is based on your approach and involvement. There will always be someone who gets in the way. Be in charge of your future — do not coast or get complacent.*

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# WHAT CHALLENGES IN YOUR FIELD KEEP YOU UP AT NIGHT?

Challenging work is what keeps many motivated in their career, but it also can lead to some sleepless nights. Many of our respondents shared their worries about regulatory pressures, especially those related to sustainability and environmental regulations, safety in operations and the growing threat of cyberattacks. They're also concerned about workload demands, the lack of skilled labor and management's lack of focus on long-term, technically sound solutions. The impact of technological changes, automation and AI is also looming large in their minds, as is the need to balance sustainability with business viability. See what's bothering your peers — here's a list of what respondents said in their own words:

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*Regulatory and Government intervention.*

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*Security.*

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*The closed-mindedness of my peers.*

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*Low demand in the PVC market.*

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*Cyber-initiated attacks on energetic (high temperature/high pressure) operating processes for which there are few current mitigations.*

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*Safety.*

---

*Environmental changes and obstructions.*

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*Too much to do. I accepted the job with the understanding that a program was in place. In actuality, I have had to build the program from scratch, with no help. My employer did not have a grasp of what they were asking me to do.*

---

*Another pandemic or disastrous natural event will challenge the industry.*

---

*Automation to a point where no one understands the core business anymore.*

---

*Completing work on time.*

---

*Almost nothing keeps me up at night. I've seen the worst my industry can throw at me.*

---

*The idea that process safety is still low in some parts of the industry.*

---

*Ability to keep a trained workforce.*

---

*Environmental regulations preventing companies from growing.*

---

*Eroding organizational knowledge/memory coupled with inexperienced workforce.*

---

*Sustainability drivers from the marketplace and governments around CO2.*

---

*Emissions/decarbonization and plastics circularity.*

---

*We need to move towards our carbon-reduction goals, but there are many constraints that make it difficult to achieve.*

---

*Decarbonization and increased expectations from customers regarding sustainability.*

---

*I am continually placed into positions in which I have little previous experience.*

---

*Growing unrealistic regulatory requirements. Many are necessary, but some are just over-the-top.*

---

*We have a push towards sustainability, greenhouse-gas reduction and circularity that I don't think makes good business sense. I'm not opposed to it within reason and where it can be justified, but doing so when sites in other areas of the world are not held to the same standards makes our site less competitive.*

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Maintenance availability between units on site.

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Too much work to do and too few people to do it.

---

Our company was recently purchased and we are getting the company acclimated to the parent company.

---

Engaging hard-to-satisfy coworkers, and making sure the safety procedures are followed.

---

Working with other managers that only care about themselves and how they look and appear. The pressure put on employees due to their lack of education.

---

The ability to meet increasingly unreasonable environmental regulations.

---

Lack of technically competent craftspeople and long equipment delivery.

---

Ignorance and stupidity.

---

Reliability of aging equipment, lack of expertise and training in current plant maintenance staff.

---

Getting CCS implemented.

---

Communicating the importance of best practices to senior management at my employer and client companies.

---

Problematic processes.

---

Working in the chemical industry, I worry that products we make will have a net negative impact on society.

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Challenges are to be met, not feared. I sleep very well.

---

Overall lack of experience and feelings of entitlement in newer employees.

---

Safety threshold calculations with limited/flaky data, locating international shipping regulations.

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Health and safety culture in industrial chemical facilities, particularly in more rural areas.

---

AI replacing me.

---

Changing government regulation. Conflicting environmental regulations across the globe.

---

People issues. Employees not performing their jobs.

---

Not meeting sales goals.

---

Keeping up with technology.

---

Operations not producing to product specification, and someone dies because of that.

---

Spending time and money on wasteful ESG reporting requirements.

---

Difficult technical problems; how managers view your contributions.

---

Squandering natural resources to decarbonize for decarbonizations' sake.

---

Knee-jerk reactions to the latest political trends.

---

Using automation correctly.

---

---

*Process shortcuts.*

---

*New regulations on carbon capture, hydrogen manufacture, limiting oil production in this state. Big companies are pulling back.*

---

*Supply chain deficiencies and uncontrollable cost increases.*

---

*Headcount, lack of qualified personnel in the field.*

---

*Cyberattacks on process facilities.*

---

*Making advances in a very mature field.*

---

*Lack of appreciation for fundamental, basic programs and procedures; too much focus on finding a "silver bullet".*

---

*Rising prices of everything.*

---

*How to leave a planet fit for my children and grandchildren.*

---

*Inability to find and retain enough employees.*

---

*Abnormalities of equipment failure that stop plant production.*

---

---

*Meeting deadlines. Unreasonable expectations of management.*

---

*Hard to find good engineers.*

---

*Safety around hazardous and explosive substances.*

---

*None. I sleep well. My employer's problems are NOT my problem at home.*

---

*Competition in this specialized industry, market.*

---

*Lack of management awareness and commitment to process safety.*

---

*Emerging contaminants.*

---

*Cost of pharmaceuticals*

---

*The lack of integrity in analyzing data. Politics are driving the outcomes of science and engineering. We ignore the facts and state perceptions as facts.*

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# HOW DO YOU FORESEE THE FUTURE OF OPERATIONS EVOLVING?

According to comments from engineers we surveyed, the future of chemical engineering operations is expected to be dominated by automation, AI and data-driven technologies. They predict operations will become increasingly digitized and remote, with more reliance on smart systems for optimization. Sustainability and regulatory demands will also play a major role in shaping future operations, with a need for carbon neutrality and environmentally friendly practices. As technology advances, some jobs will disappear but be replaced with a greater demand for highly specialized skills in AI, automation and data analytics. Read more on what your peers had to say about the future of chemical engineering.

---

*I foresee continued growth and innovation.*

---

*Becoming more and more automated = companies needing fewer employees.*

---

*More automation, more expensive government regulations.*

---

*More automation, higher degree of software knowledge required for chemical engineers.*

---

*With low demand and then low production.*

---

*Greater emphasis on safety, security and upset operability due to increased threat from cyber actors targeting operating processes.*

---

*Continued workforce challenges; increased reliance upon data analytics.*

---



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*Zero emissions.*

---

*Robotics and automation will require a different skillset.*

---

*AI may play a large in our process, along with robotics.*

---

*More access to big data to drive improvements.*

---

*I see more automation and "smart" technology coming into use.*

---

*New facilities replacing old facilities that are too expensive to upkeep.*

---

*Some use of AI in the process diagnostic area.*

---

*More specialized and customized.*

---

*More digital-oriented and fewer people.*

---

*More optimization.*

---

*More automation, more computer-controlled systems in general.*

---

*Improvements will be made to process monitoring and process control allowing for better optimization and maximization of output, but the engineer will still serve and a bridge between the AI world and the real world of piping, pumps and valves.*

---

*More AI and better data usage.*

---

*Ever increasing automation and leveraging data-analytics/AI in effort of reducing staffing.*

---

*I see things only getting worse since outsourcing a lot of work.*

---

*Autonomy.*

---

*Automated with data analytics driven by AI.*

---

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*It will only evolve if you have leaders that are open-minded and willing to take calculated risks.*

---

*New technologies to continue to reduce costs and meet more difficult regulations.*

---

*Depends on if the United States takes education seriously. High school graduates in East Tennessee are borderline illiterate, and basic science skills are nonexistent.*

---

*Further automation and data collection to learn more about our current processes to be able to continuously improve our operations.*

---

*AI will be used to further reduce headcount on all levels.*

---

*More use of digital twins and AI, especially Natural Language Processing to help locate the correct procedure(s).*

---

*More computerization and better process control.*

---

*There will be more online measurements and more automated control of processes.*

---

*Artificial Intelligence will play a much bigger role in manufacturing.*

---

*More reliance on computer controls, potentially AI.*

---

*There is a battle between environmentalists' disregard for science, industry's greed and legislators' lack of knowledge.*

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*Growth of international trade, market growth for very high-value products.*

---

*Chemical manufacturing will always be there.*

---

*AI eliminating jobs.*

---

*There will be many changes in the petroleum refining and petrochemicals production in the next 20 years.*

---

*We will have to adapt to different regulatory environments in different regions of the world.*

---

*The engineering problem remains the same.*

---

*Less-skilled operators relying on AI.*

---

*More IIOT and AI in business. If over-regulation continues, moving offshore.*

---

*AI will dominate the industry.*

---

*Companies will look for candidates who are very well-trained before recruitment, and more employees will look to work independently to support the industry as needed.*

---

*It ebbs and flows. Now, it is top-down, but in a few years, it will be bottom-up for the types of projects one works on.*

---

*Solar DAC to syngas to chemicals/fuels with accelerated nuclear power supply will become the oilfields of the future. Operator skill will be developed through training simulators/digital twins.*

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*It has to be sustainable, carbon neutral, environmentally friendly and still affordable. It will be important how this burden will be managed.*

---

*More automation, more consistent operations.*

---

*Education and automation.*

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*There will be more automation and lean initiatives, so it will require people who will have the skills to work with those aspects, but we will also require people who have trade skills. Supply chain resilience is another strong point that chemical companies will have to master.*

---

*Operations being hamstrung by all kinds of social and governmental issues.*

---

*More use of sustainable surfactants and variable market fluctuation.*

---

*More and more AI to help but needing significant people involvement, especially in the chemical industries.*

---

*Greater convergence between IT and OT.*

---

*Increased automation/technology to help run the line.*

---

*Less of a focus on petroleum refining.*

---

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*More AI and electronics, thus more distance and separation between operations, especially operators, from truly understanding the processes.*

---

*Quality reduction to offset rising costs.*

---

*More automated, safer.*

---

*Less manpower with advancement in future instruments and equipment remote monitoring.*

---

*Operations is increasingly going towards more automated technology, which requires specialized skills that are hard to teach to somebody right off the street. An emphasis on training and troubleshooting is important.*

---

*Quicker design.*

---

*Automation will progress. Human talent will be applied to developing and operating more robust technology — less boutique.*

---

*Slow but steady growth. Economic conditions are a definite influence as it relates to our large corporate customers.*

---

*Green initiative challenges.*

---

*The oil and gas sector has seen its good days but still has some potential left in it.*

---

*Less empirical and more political. Poor troubleshooting skills and interpretation of data.*

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# WHAT KEEPS YOU MOTIVATED IN YOUR CAREER?

Chemical engineers are motivated by a combination of intellectual challenges, opportunities for continuous learning and the ability to make a tangible impact on processes, safety and people's lives. Mentorship, collaboration and the dynamic nature of the field keep them satisfied in their roles. In addition, some noted personal considerations such as family security and career advancement play a significant role in maintaining their motivation. Here is what your colleagues said about their job fulfillment.

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*Knowing that we're sending our employees home at night in as good physical and mental shape, or better, than when they arrived for work.*

---

*Learning. Always learning. And teaching others what I learned.*

---

*I enjoy solving problems and sharing knowledge.*

---

*Doing a good job at what I do. Ensuring my superiors are happy with the work I put out, regardless of what my peers think of me. Working on sustainable chemicals to alleviate the demand for synthetic chemicals.*

---

*Informally advising working colleagues on how to better understand cyber-initiated attacks, so they can find better ways to protect operations and engineer safer override/shutdown procedures.*

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*Ability to defend with real-world experience.*

---

*Mental stimulation, paycheck, helping the next generation of workers so they can avoid making serious errors.*

---

*Improving the processes and performance of manufacturing products for consumers.*

---

*My drive is to complete my daily task in an expedient and timely manner.*

---

*The people and pay.*

---

*Doing new and interesting things.*

---

*Advancement opportunities.*

---

*The challenge of building new facilities.*

---

*Variety of work and opportunity to work on new technologies.*

---

*Opportunities to continue to build my skillset in preparation for offering consulting services after I retire.*

---

*HSE tends to be its own reward.*

---

*Retirement in less than one year.*

---

*Ability to add to the knowledge and conduct safe operations.*

---

*Working on challenging problems.*

---

*The job I have now matches the skillset I've built up over my career very well. There are a lot of challenging issues to work on, and I can readily see the results of my work.*

---

*Interesting and challenging work. Opportunity to represent my company in external organizations.*

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*Helping new employees learn so they can take over (and I can retire with a clean conscience).*

---

*I like improving things and fixing problems, which therein makes my job even easier through better reliability, improved product quality and less reactive work, while making step changes in safety performance and environmental compliance.*

---

*Never working on the same thing, always interesting.*

---

*Training, changing roles and responsibilities.*

---

*The relationships that I make along my journey.*

---

*That there is a need for creative thinking and planning to harness greater manufacturing statistical process control.*

---

*Gaps and inefficiencies in leadership and engineering allows for potential growth. Biggest challenge is overcoming leaders that do not want to let go and who sabotage others' advancement due to their own insecurities. Better for the ship to sink than to expose their true character.*

---

*Continual learning and innovation.*

---

*Understanding that affordable energy drives the economy and improves lives, even though much of the general public fails to understand this.*

---

*Challenging projects.*

---

*Fixing problems.*

---

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Retirement.

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The chance to make a difference in peoples' lives.

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Learning new things and getting backlogged work done

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Opportunity for future promotion.

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Desire to solve each new problem as it emerges.

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Getting the proper recognition.

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The intellectual challenge and the salary.

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Helping people and keeping them safe.

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Challenging work and training the next generation.

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New technology and challenging projects.

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Opportunities to learn new skills and teach others.

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The challenge to develop new products.

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Intellectual challenges that advance my learning and, most importantly, the opportunity to mentor.

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I am coaching and training new engineers as well as implementing new engineering structures and services to new business companies.

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Opportunity to improve operations for employees and train younger engineers.

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Getting to contribute to the advancement of technology that was initially developed by better engineers than myself.

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Interest in advancing consumer product safety.

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Problem solving. Ensure product is made.

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Minimizing safety risks for my colleagues.

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Colleagues, getting orders.

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Helping and educating employees and employers on the importance of a robust and compliant process safety management program.

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Problem solving.

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The will to learn new things and the feeling that you help the workers do their job easier and better.

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A positive work environment. I need the money for inflation protection.

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Difficult design challenges. Most employers are not going to care about the technical problems we face until there is a catastrophe.

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The prospect of leaving a good legacy when I retire.

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Knowing that engineers can improve systems and processes.

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I am very near retirement, so I mostly like keeping to my acquired skills.

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Innovation and the ability to design greener products.

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No one else can do it.

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Family considerations, coworker relationships, challenges and opportunities for developing self and others.

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Learning new things every day is what keeps me engaged and motivated.

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Helping improve the knowledge base.

---

I like solving problems for my team and making an impact.

---

I like the ongoing challenges and variety of projects that I get to work on.

---

Making novel and improved products of construction.

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When there are small wins and on the occasion a site reinforces fundamentals, basic programs and procedures. When a site truly works together, regardless of what "hat" they wear when they walk through the gate.

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The need for health insurance.

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Stimulating tasks.

---

My own inner happiness.

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Small wins.

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New technologies and keeping plant equipment upgraded as obsolescence of current equipment increases as plant ages.

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I stay motivated by revisiting advancement opportunities and thinking about where I want my career to end up.

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Successful projects.

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Helping others directly and having the human contact and interaction.

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Creating top-quality products and designing new product variations to serve existing customers. Also, the challenge of innovation in our plant to make production more efficient.

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Family security, plant success, personnel safety.

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To do the right thing.

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Public safety.

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New assignments and drugs.

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Finding solutions to problems.

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