

Chemical Engineer interview questions

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What to expect

Chemical engineering interviews mix technical depth with safety judgement and cross-team collaboration, since the role sits between design, operations and compliance. Expect panels that include a senior engineer and someone from operations or HSE, especially for roles in manufacturing or process plants.

- **Technical:** Questions on process design, simulation software and mass/energy balance calculations to check core engineering competence.
- **Safety and compliance:** Questions on hazard analysis, HAZOP and regulatory requirements, since process safety failures carry serious consequences.
- **Behavioural:** Past examples of troubleshooting, scaling processes or working through a production problem, usually assessed with STAR.
- **Scenario/judgement:** Hypothetical production or safety situations to see how you'd prioritise and respond under pressure.
- **Client-facing/stakeholder:** Questions on working with operations, quality and maintenance teams, since process changes rarely succeed without buy-in from these groups.

Most interviews open with a walkthrough of your CV and current or most recent role, move into technical and safety-specific questions, then a scenario question to test judgement, and close with your questions about the plant, team structure or upcoming projects.

1. Walk me through how you'd approach designing a new process line, from initial concept to a workable plant layout.

Why they ask

This checks whether you understand the actual design sequence, including simulation, standards and layout constraints, rather than just naming software.

How to structure your answer

Walk-through: describe the stages in order (process concept, simulation and material/energy balances, equipment sizing, layout, safety review) and where you'd bring in other disciplines.

Example answer

"I'd start by defining the process chemistry and required throughput, then build a simulation in Hysys to run material and energy balances and check the reactor and separation steps make sense at scale. From there I'd size major equipment, draft a preliminary layout in AutoCAD considering safe distances and maintenance access, and run that layout past operations and HSE before locking it in. I'd expect a few iterations once real equipment quotes and site constraints come back."

2. Tell me about a time you had to troubleshoot a production problem that wasn't behaving as the lab-scale process predicted.

Why they ask

Scaling lab formulations to commercial production is a core task in this role, and interviewers want to see practical problem-solving, not just theory.

How to structure your answer

STAR: situation, task, action, result, with specific detail on what you changed and why.

Example answer

"During a scale-up trial, a formulation that worked fine in the lab started fouling a heat exchanger within a few batches. I reviewed the process data, ran additional energy balance calculations and found the temperature profile at commercial scale was different enough to cause localised fouling that hadn't shown up at bench scale. I adjusted the heating sequence and added a cleaning step between batches, which resolved the fouling and let production continue at the planned rate."

3. How would you run a hazard analysis for a new or modified process, and what would you do if you identified a risk that wasn't in the original design?

Why they ask

Process safety is central to this role, and this tests both your HAZOP knowledge and how you'd handle a finding that disrupts the schedule.

How to structure your answer

Process explanation plus judgement-under-pressure: describe the standard method, then how you'd escalate an unexpected finding.

Example answer

"I'd run a structured HAZOP with operations, maintenance and safety representatives, working through each node of the process to identify deviations and their consequences. If we found a risk that wasn't covered in the original design, I'd stop and document it clearly, then raise it with the project lead rather than pushing ahead to meet a deadline. Getting the schedule right the second time is better than commissioning a line with an unresolved hazard."

4. A reactor is running below expected yield and the plant manager wants it fixed by end of week. How do you approach this?

Why they ask

This scenario tests how you balance commercial pressure against sound engineering practice, a common tension in production environments.

How to structure your answer

Judgement-under-pressure: outline your diagnostic priorities, what you'd do within the timeframe, and what you'd refuse to compromise on.

Example answer

"I'd first pull recent process data to check for obvious deviations in temperature, pressure or feed composition, and run the numbers through a quick energy balance check to narrow down likely causes. If I could identify and correct an operational issue within the week, I'd action that. If the root cause needed more investigation or a design change, I'd tell the plant manager what's achievable by Friday and what needs more time, rather than making a change I wasn't confident in just to hit the deadline."

5. Describe a situation where you had to get buy-in from operations or maintenance staff for a process change they were reluctant to support.

Why they ask

Process improvements only work if the people running the plant support them, so this checks stakeholder management skills.

How to structure your answer

STAR: situation, task, action, result, focusing on how you communicated and adjusted your approach.

Example answer

"I proposed a change to reduce waste on a production line, but the operations team was concerned it would slow down changeovers. I sat down with the shift supervisors, walked through the data on waste reduction and asked for their input on how to minimise the changeover impact. We adjusted the implementation plan based on their feedback, which reduced scrap rate without adding meaningful"

time to changeovers, and the team was more willing to support future changes as a result.”

6. What process simulation and design tools have you used, and how do you decide which one fits a given task?

Why they ask

This checks practical familiarity with software like ASPEN Plus, Hysys or Pro/II and whether you understand their strengths rather than just listing tools on a resume.

How to structure your answer

Technical explanation: name the tools, describe a task each suits, and note any limitations you've worked around.

Example answer

“I've used Hysys most for steady-state process simulation, particularly for material and energy balances during design or troubleshooting. For more detailed thermodynamic modelling I've used ASPEN Plus, and I use AutoCAD for layout work once the process design is settled. I generally choose the tool based on what data I need out the other end. Hysys is faster for quick sensitivity checks, while ASPEN gives more rigour when I need to justify a design decision to a client or regulator.”