Random Thoughts . . .

ON-THE-JOB TRAINING

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Sheila: Good morning, Reggie—great to have you with us. I'm Sheila Conner, head of Process Engineering.

Reggie: Nice to meet you.

S: I was really hoping you'd join our group—I saw your file and you don't see 3.9 GPAs every day, especially coming from your university.

R: Thanks. I'm looking forward to using what I learned there.

S: Well, you'll get plenty of chances to do that here. As they probably explained to you, we get involved in almost everything that happens in the plant—designing new processes and products, retrofitting, troubleshooting, you name it. How does that sound?

R: Um, good, I think. I just took plant design last spring, so I'm probably more up on that than on that other stuff.

S: I see—well, anything you're not sure of, just ask anybody here. As a matter of fact, there's something we could use your help on over in hydrides...the efficiency of one of their packed absorption towers has been falling for the last week and they can't figure out what's going on. Go over to Building 293 and ask for Ben Whitman—he'll fill you in, and then see if you can figure out anything.

R: OK.

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R: Excuse me, are you Ben?

Ben: Yeah—what can I do for you?

R: I'm Reginald Bunthorne. Sheila from Process Engineering sent me . . . something about an absorption tower?

B: Oh, yeah. Come into the office, kid, and I'll show you what we got. OK, here's a GC trace on the off-gas line from about two weeks ago—this peak is CMPH, and it's down around 2.5 where it's supposed to be. It started to creep up on us last week, and here's yesterday's trace—the peak is up to 7, which means we're absorbing a lot less CMPH than we're supposed to. Unless we can fix this, we're going to have to take the process off line and break down the tower to see what's going on, and a lot of people across the street will be very unhappy if we do that. Got any ideas for us, kid?

R: Um . . . I think we once used the diffusion equation and Henry's law—or maybe it was Raoult's law—to analyze a continuous packed absorption tower. I could try doing that.

B: Say what?

R: Of course I can only do it if the column is isothermal. It is, isn't it? If it isn't, I think I'd also have to write a differential energy balance equation, and that's farther than we ever went in that course. I can give it a shot, though—you do have Matlab here, don't you?

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B: (Looks suspiciously at Reggie and says nothing)

R: Let's see—I think I'll also need to know the diffusivity of—what was that, CPMH?—and the Henry's law solubility. Do you happen to know what they are?

B: Uh, tell you what, kid—we've got a few ideas we want to try first, so let's hold off on that stuff for now. I'll check in with Sheila and tell her we'll call again if we need you.

R: OK, and don't forget the diffusion coefficient.

B: Trust me, I won't forget it.

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S: So I hear you had a session with Ben yesterday. How do you think it went.

R: Fine—I'm surprised I haven't heard back from him.

S: Hmm. Well, we've got another job over here I'd like you to take a look at. It's a distillation column we need to design for a pretty tough separation—think you can handle it?

R: No problem—I did a couple of them in mass transfer . . . I think we also did one in plant design, but one of my teammates handled that part.

S: Um . . . yes . . . fine. Here's the folder with the design specs . . . let me know if you need anything else.

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S: Yes, Reggie—got something for me on that column?

R: I get that you need eight theoretical stages.

S: What?

R: Eight theoretical stages—here's the McCabe-Thiele diagram.

S: Uh . . . how'd you do McCabe-Thiele with nine components in the feed?

R: I just used two components I could look up data for in Perry's Handbook and used Raoult's law to come up with an equilibrium curve and then did McCabe-Thiele.

S: For a multicomponent system with nine highly polar compounds?

R: Well, they never really talked about systems like this in mass transfer—the professor said that equilibrium separations were trivial and we spent most of the course solving differential equations for rate-based processes . . . and I tried finding vapor pressure data for those other feed compounds but they weren't in Perry, so I just made some simplifying assumptions.

S: Ah, some simplifying assumptions. OK, why don't you let me have the file back and we'll take it from here. Let's see—you know any process control?

R: Yeah, we learned how to calculate transfer functions for linear systems.

S: But real-time control for nonlinear systems?

R: They said they didn't have time to cover that.

S: What about statistical quality control?

R: Um, no—we had a couple of weeks of statistics in the unit ops lab . . . means and standard deviations and t-tests and that stuff, but they never really explained what you do with it.

S: Ever size a pump?

R: No—pumps were in the fluids syllabus, but the prof. took so long on the Navier Stokes equation that we never got to them.

S: Know anything about separation process synthesis?

R: Um . . . not really.

S: Heat exchanger networks?

R: No—we only did single exchangers.

S: Using overall heat transfer coefficients and log-mean temperature differences, right?

R: Uh, yes. We were supposed to look at solving more complex problems using a simulator, but the prof. said we needed to learn the fundamentals before getting into black box simulations and I guess we never got past the fundamentals.

S: Equipment cost estimation?

R: My design teammate did that part.

S: I see . . . OK, to tell you the truth, Reggie, I'm not sure there's a good fit between your skills and the kind of things we do around here. I'm going to talk to Human Resources about finding you a more suitable position.

R: All right . . . but in the meantime, what should I do while I'm here?

S: Know how to use a coffee maker?

R: Um . . . . ❒

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