Prelims Questions 2002 (Compiled by Megan Ruegg)

Thermo/Kinetics

Pudge Colaco

I had katz/arup for thermo/kinetics and blocked everything from my mind because they crushed. katz threw me for a loop by asking me a thermo question and then i just saw red for the rest of the 45 minutes. for arup, it was all about minimizing energy or maximizing entropy, so figure out how those could relate to the question he's asking and then b.s. something.

Matt Robertson

Bell/Chakraborty

1. What does "k" represent (i.e. collision frequency, transition state theory stuff)?
2. Bell then had me derive the design equation for a PFR. Then he asked about the assumptions I made when writing the mole balance (think axial dispersion)
3. Chakraborty then stepped in and asked about deriving the Clausius Clapeyron equation.
4. Rubber band question (i.e. why does it shrink when you heat it).
5. Then a question concerning the behavior of metal when you heat it and how it differs from the rubber band.

Megan Ruegg

Maboudian/Clark

(Didn't know this beforehand, but Maboudian likes engine questions and fugacity)

1. What is the chemical potential? $[\partial(nG)/\partial n_i]_{T,P},n_j$
2. What is the chemical potential of a pure species?
   $n*(\partial G/\partial n) + G*(\partial n/\partial n) = G$ = Gibbs energy per mol
   because first term $(\partial G/\partial n)$ is zero for a pure species
3. How do you calculate the fugacity of a pure species? In a mixture?
   Putying factor, Wilson/Margules, G^E – equation of state
4. Draw P vs. x and T vs. x phase diagrams for a binary system.
   What is it called when the lines cross? When you have liquid and vapor together?
5. Question about parallel reactions A ->U and 2A -> D
   How would you define the selectivity?
   How is it affected by C_A and T?
6. What is a way to model a non-ideal reactor? 1 parameter and 2 parameter models.
7. If you have a packed bed, how does pellet size affect selectivity?

Justin Notestein

Chakraborty and Bell

Bell asked about consumption of oxygen in a sealed box as it reacts on a tungsten wire. We coupled the surface reaction with the net balance on the box. As a follow-up, we discussed the origin of the pre-exponential factor and the activation energy. Arup asked why water splatters when added to oil and why squash racket strings get more taught with temperature. In the first, the temperature rises above the spinodal temperature, leading to spontaneous nucleation of bubbles whereas in the second, the system moves to an entropically more favorable state, random coil, and away from a more stretched configuration, thus tightening the strands. Quick exam.

Bernardo Da Costa

Bell and Maboudian

Bell started asking questions about kinetics, lots of questions related to what we covered in the kinetics grad course (since he taught the course). He expects you to give a quick answer to what he is asking, and he keeps throwing questions at you for sometime while you are trying to think/explain. Maboudian asked about fugacity and an engine cycle, she always asks about that. She is generally helpful.

Tim Logan

Chakaborty and Katz

Katz started this one off with a somewhat complicated kinetic question. It was basically an exothermic reaction with a complex rate occurring in a spherical particle. Basically there were two things I needed to cover: 1) the diffusion of the reactants and 2) the temperature effects on the rate.

Chakaborty had two quick thermo questions for me:

1. Why do cheap soaps have more lather? A: since cheap soaps have less additives (like moisturizer) they have more surfactants which lower the surface tension and produce more bubbles.

2. Show why ice is less dense than water. I used the Van't Hoff equation (is that what it is called?) and the slope of the phase diagram to prove this one.

This exam was quick (only about 25 minutes). I was the last test of the day and apparently I wasn't the only one looking to get out of there. I passed this one so being let off early isn't always a bad sign.

David Durkee

Reimer / Clark

I did a few problems here. First was a theoretical machine that violated the second law. Easy enough to show that it was not possible. Then they asked me about activity and fugacity, and I derived some equations for them. They asked the best place to find this info, and I said look it up, but they were looking for equation of state. Then they asked me about simultaneous diffusion and reaction in a slab. I derived the necessary balance and simplified. I called the parameter for reaction vs. diffusion rate the Theile modulus, but I think they preferred Damkohler number. Then they asked me whether I should increase or decrease temperature to increase the performance of this system.

Vicki Demas

Bell & Maboudian

God forbid…. This was a nightmare for me (for real). So for kinetics we had Bell that past semester, and I think he is very nice, but I did quite badly in the final exam. There was this question about a cylindrical flow reactor with porous catalyst on the wall. I had nightmares that Bell would ask me the same question in the prelim, so I really wanted to find the solution somewhere… Well I didn't, and sure enough (after a couple easy equilibrium questions) I got asked the same question! I made up some things (the same I made up during the final). Then Maboudian asked me some simple thermo questions (I think she felt sorry for me after the kinetics part). She asked the laws of thermodynamics, and then a refrigeration cycle. She was a little impatient with me, because she first asked me to draw a diagram and I drew a ST diagram instead of the little sketch (she kept saying we don't have time and I had to think faster, but she did explain what she wanted, so I finally drew it). I was very happy when the time was over and I could leave the room (off course I didn't look very happy at the time)

Jason Bronkema

Reimer and Clark

Prof. Reimer started out by asking a question about the work needed to separate a large volume of noble gases at the same temperature. The answer that he was looking for involved using the mixing rules for ideal mixtures and he helped me out when I started to go off track. Then he asked me why the hydrogen atom has 0 entropy ideally. Finally Prof. Clark asked me some questions about kinetics and equilibrium. I don't remember exactly what he was asking, but he wanted me to write a rate law and explain some of the assumptions that are made in writing the equation.

Adam Meadows

Bell and Arup

-I first got grilled on elementary reactions: what is the the order of reaction and its significance, what is the molecular meaning, what is contained in the rate constant, where do every one of the pieces in the Arrhenius form come from, etc

-Then I got asked some questions about a cylinder with a gas flowing through it (PFR), no radial gradients; write out equations governing system, get out Pe # and provide physical interpretation of what happens at extreme values

-Finally Arup jumped in and asked me why if you flick water onto boiling oil it splatters, but not vice versa. I honestly don't know (and didn't at the time) the exactly correct answer to this problem. I remember trying to say something about different boiling points but Arup didn't like that at all. I then drew a spinodal/binodal curve and made some stability arguments there that seemed to please him and we then proceeded to talk about metastable states for a while.

-Next Arup quized me on what the problem of protein folding in an organic solvent is. Again, he didn't like my answers. Just so you all know, the primary driving force in protein folding is not that the protein is going to it's lowest energy state, but that the entropy of the surrounding water molecules is maximized when the protein is fully folded.

-Lastly, Arup tossed me a softball by asking me to calculate the change in entropy of an ideal gas when it is compressed to half its volume.

Dewey Mair

Prelims Questions 2002 (Compiled by Megan Ruegg)

Reimer and Clark

Reimer began the session by asking about the difference between a thermodynamically controlled and kinetically controlled reaction. I wasn't sure what the difference was but the answer is that a thermodynamically controlled reaction is reversible (has some equilibrium constant) and that a kinetically controlled reaction is irreversible. Yes, there are more differences between them but this is the answer they were looking for. Then, Reimer asked me to calculate the temperature dependence of a thermodynamically controlled reaction. Know the van't Hoff equation. Then they asked about the frequency factor for a rate constant, and that was the end of thermo. They divided the time: 20 minutes for thermo, 20 min for kinetics. Then, Clark asked which reactor should be used for a series reaction. Answer: PFR, talk about residence time distribution and conversion in CSTR vs. PFR. I was quite fortunate to have been asked this question because I was looking over the answer to this exact question just before I walked in. Clark then asked about catalytic reactions, effectiveness factors, and Thiele parameter.

Pat McGrath

Maboudian and Clark

Draw a Carnot cycle. Do a couple of different diagrams (I had to start with the typical P-V and T-S diagrams). There were a couple of questions about efficiency. Apparently the efficiency of the Carnot cycle is the same for a real gas as it is for an ideal gas.

I can't really remember what I was asked for kinetics. I know that I went off on a twenty minute derivation of the Thiele modulus for a spherical pellet. However, all Clark wanted to hear was the term "Thiele modulus" which I saved for the end of my twenty minute derivation. Big waste of time.

Smita Agrawal

Maboudian & Alex Bell

Roya started off with the basics all right… from the 3 laws of thermodynamics!!! But from there she basically walked me chapter by chapter thru my whole undergrad thermo book!!! Starting from the most ideal systems.. adding non idealities at each step…to the most non ideal systems… how would u find the thermodynamic properties at each step.. So if u have Roya on your committee, you better know your fugacities and activities quite well!!!

After Roya was done Bell didn't really have much time left.. so he asked me a question on surface catalysed reaction.. something about reaction on a Pt wire in a almost vacuum chamber… I think there was surface deposition going on.. I had to draw a few concentration – time graphs for various temperatures… and then it went on to what happens in a bulb… the system was similar to a bulb….

That was pretty much it… of course it was almost time for Keg!!!! ☺

Björn Moden

Maboudian and Bell

Maboudian asked about fairly basic thermo things. What are the first and second thermo laws? What's fugacity? How is it defined? Why is it important? What do the Carnot and Rankine cycles look like? I drew one of the lines with a slightly wrong slope, so then they asked me to derive it which took some time and help and some comments from Bell, who was anxious to start asking kinetics questions.

Bell asked about a container in which you removed oxygen from a gas (Ar or some other inert gas) by reacting it with a tungsten (W) wire. He didn't say much more at the beginning, so it was up to me to ask for other information that I might need. Is it well stirred? – It's up to you. – OK, so it's well stirred. To get the kinetics: does O2 adsorb associatively or dissociatively? – Let's say dissociatively (not too important for the problem though). So I started to draw the reactor and drew inlet and outlet flow and Bell asked where I got the flow from, so it was supposed to be a batch reactor. Then I did the kinetics and dynamic mass balances – need to have one transient MB for the oxygen and one for the tungsten/tungsten oxide. I didn't include the transient tungsten balance at first, but only the overall W+Woxidixed=Wtot and Bell got a bit cranky ("You won't get it done unless you have this equation."), but finally I got it and felt stupid for not writing it right away. Then he asked what I thought would happen to the rate as the reaction went along, especially with respect to the tungsten. As more oxygen adsorbs and covers a larger fraction of the surface, the activation energy for adsorption will increase because of repulsion between the adsorbed O atoms, so k will decrease when you start to get substantial amounts of O on the surface (or something like that). Also the reverse reaction might start to occur. He was just looking for short fairly qualitative answers on the last ones, so it went ok.

Transport

Pudge Colaco

I had radke/newman for transport and got asked the heat transfer question about cooking a chicken or turkey with a metal nail inserted in it. They also asked another question about some type of surface deposition but I can't really remember any details about it.

Matt Robertson

Neuman/Graves

Quesions asked.. (it was the end of the day and I think they were tired)

1. Why wasn't the Rose Bowl in Pasedena last year? (They really asked...)
2. If you put a rod in a turkey how does that change the cooking time.

Megan Ruegg

Muller/Radke:

1. Electric current through a copper wire that is insulated, solve the transport equations.
2. Something to do with Susan's research that I can't quite remember.

Justin Notestein

Newman and Graves

I couldn't believe it, but Newman actually asked the turkey and nail problem. After pretending to think about the problem for a while, I wrote down the Fourier number and said "4". Afterwards, we discussed solving different variants of the problem and whether the Fourier number was adequate to describe it. We set up a pair of coupled differential equations describing a cylindrical nail inside a cylindrical turkey. I just threw out different possible boundary conditions (surface controlled vs. constant surface temp vs. full model) and just babbled for a while. No attempt was made to actually solve the problem.

Then we did diffusion of a vaporizing liquid through a capillary of another stagnant gas. An Arnold (?) Diffusion cell. Assume a slowly moving liquid height and go to town. Don't let Graves try to confuse you. After questioning what I had written for 10 minutes, he finally admitted what I had written was right, but wanted me to phrase it differently.

Bernardo Da Costa

Schaffer and Graves

They asked me to derive the Hagen-Poiseuille law (volumetric flow rate in a circular pipe, one of the first examples in BSL). Graves mention something that I had memorized the solution for that problem. At the end of this question he left the room. Schaffer asked about temperature profile within an ice block in a box that was insulated at one end and on the top/bottom of the box, the other end of the box was open.

Tim Logan

Newman and Radke

They began the exam by asking me what textbooks I used in undergrad, I did a poor job of answering these questions. There were two basic questions asked in this exam and they were asked of everyone who had these two. The first question was the standard "Turkey's Butt" question. I was ready for it, maybe to ready. Looking back I think I should have pretended to struggle a little more on this one. I wrote down the erfc penetration solution but then struggled to explain why $\frac{L^2 t}{\alpha} = 1$ equaled one and not some other number. Hint: it has something to do with the value of the erfc function at one. Radke hounded me on this one.

The next problem was a 1-D system of a protein adsorbing out of solution onto some surface. I did a shell balance on the flux and set up the differential equations. It was a SL-system. There was decreasing mass with time. At the end they added a reaction term. It was a straight forward question. There wasn't a lot of time for this one because Radke had spent so much time asking me the previous question.

All in all Radke and normally calm Newman took turns harassing me. It all ended well as I passed.

David Durkee

Radke/Newman

The now famous turkey-nail problem. I modeled the turkey as a sphere and halved the characteristic length with the addition of a heat source in the center. I showed the solution set in non-dimensional form with the exponential of the negative fourier number, and scaled Legendre polynomials. I also commented that the solution is more suited to cylindrical symmetry, because a nail is a cylinder. Went through that with the same time dependence and some Bessel functions. Then they told me to leave. My best test of the day.

Vicki Demas

Muller & Balsara

When I walked in to the room they both tried to make me feel better (I always stress out too much). Then they asked what books I had as an undergraduate, so I was asked a question from BSL (which I had looked through during the break). They asked me to derive the equation for the temperature distribution in a wire of several layers of material with current running through it. After that they asked me about some dimensionless numbers. The last question, I don't remember very well, but it had something to do with a cloud in the sky. You have a meteorologist friend with hi-tech cameras and he can give you any information you want. You wanted to find out the water vapor concentration in the cloud (this question was funny, because it took them a while to make me understand, but they were both extremely nice…and patient). I was done early, but they let me go.

Jason Bronkema

Radke and Newman

First Prof. Radke asked the question about how much faster would a turkey cook with a metal rod in the center. After setting up the non-dimensionalized equations and describing different boundary conditions for the problem, they asked me about the different dimensionless numbers that could be used in heat transfer and mass transfer problems and the different heat transfer mechanisms. Finally Prof. Radke asked me to set up the equations and boundary conditions for an unsteady state diffusion problem that he descibed.

Adam Meadows

Graves and Schaffer

-Both of these guys were very laid back and friendly. The first few minutes we chatted about how Gordon Moore (of Moore's Law fame) did his undergrad in the chemistry department, and then somehow volleyball came up

-Then Graves asked me to write the equations and boundary conditions for a reaction/diffusion problem in which you have a semi-infinite Si slab with O2 diffusing through it and reacting with the Si to give SiO2. I didn't nail this one as surely as I would have liked but he still seem satisfied.

-For the other half of the exam I talked about a balloon tied to a marble with the marble suspended in water. It basically boils down to just force balances and assuming Stokes flow for marble.

Dewey Mair

Schaffer and Graves

First, they asked me to sit down and briefly discussed my transport background. I told them that we used Wilkes' book for momentum, Cengel for heat, and a combination of Geankoplis and Cussler for mass transport. Since we didn't use BSL I was not asked to solve any velocity profiles from shell balances (classic BSL stuff) and was kinda disappointed by this because I spent a lot of time reviewing that. Instead they asked me about heat transfer in the boundary layer. They asked me to draw (completely qualitative) temperature profiles for boundary layers of varying thickness. Also, you should know the approximation that boundary layer theory makes about temp. and velocity profiles. I sort of fumbled through it and got really confused because of the way Graves wanted me to set up my coordinate axes. It was quite frustrating because I was drawing the correct profiles, but not the way he wanted to see it. Then, Graves asked me to make a rough calculation of the weight of the atmosphere. F = m*a = (Area)(pressure). Since I was sort of disoriented from the previous question I began a more involved calculation but they told me to relax some assumptions and just make a rough calculation, which I got soon thereafter. I was also disappointed because I studied the dimensionless numbers a lot and wasn't asked a single question concerning them. The time flew by and I was pretty sure that I had failed this one, but alas, I passed.

Pat McGrath

Balsara and Muller

Heat transfer from electrical wire through insulation. This was a pretty easy problem, actually. The wire generated at a rate (I^2)R, and dissipated through the insulation. I made some scaling arguments to avoid solving for the temperature profile inside the wire, but Muller insisted that I solve (or at least write equations for) the whole thing. I can't remember how I did that.

Balsara asked me some questions about clouds - what's the pressure inside a cloud, what's the altitude a cloud will reach. My intuition was right on this problem, but I bungled the math.

Smita Agrawal

Muller & Balsara

Susan started off with a pretty straightforward heat transfer problem (I guess being my 1st prelim exam & at 8:00 am she wanted to keep things simple…). So anyways, the problem was to find the temperature profile in the insulating layer over a conducting wire carrying a current I. Complete with all the BCs etc…

Then Nitash asked me a problem which I thought was kind of funny… It went something like suppose u are a meteorologist and u have all the data u want regarding the air density, temp etc. at a certain height in the atmosphere, how would u go about finding out the mass fraction of water in a cloud at that height…(I think that was it or something very similar anyway…)

And after those two questions, they decided that it was enough and let me go early!

Björn Moden

Prelims Questions 2002 (Compiled by Megan Ruegg)

Muller and Balsara

Muller asked about the T-profile in a cylindrical wire, in which heat is generated. There's insulation around it as well. So it's basically putting up the governing heat conduction equations – with a heat generation term in the wire part and without the heat generation term in the insulation part. Then add some boundary conditions – dT/dr=0 @r=0, Twire=Tinsulation and Qwire=Qinsulation at the wire-insulation interface, and Tair=Tinsulation and Qinsulation=Qair at the insulation-air interface. How do you get Qair? Q/A=h*deltaT. Which dimensionless numbers does h depend on? Nu, which depends on Re and Pr to some fractional powers.

Balsara asked how I would estimate the weight of a cloud. Took a short while to think why this was a transport question and how to account for the humidity and droplet weight, but then I got what it was about. The density of the cloud is the same as the surrounding air, otherwise it wold rise or fall. So then it's just to use the ideal gas law. This prelim was the one that I expected to be the hardest so it was a pleasant surprise. It was right before lunch so I think that they were hungry and gave me easy questions to get out early. Both of them were nice and helpful.

Process Design

Pudge Colaco

I had prausnitz/wallman for process and got asked their staples: the linde cycle, basic heat exchanger questions and such, pretty basic stuff, but I got all tripped up.

Matt Robertson

Iglesia/??

Iglesia did all the talking, so I do not recall who else was on my committee

Here is what I was asked:

1. What was your senior design project?
2. General control questions. One concerned temperature control on a reactor.
3. They asked what a scrubber was and how it worked.
4. Then there was the creative portion where I had to come up with a design for a car that ran on an alternative fuel source.

Megan Ruegg

Keasling/Wallman

1. Design project
2. Control of a flash drum, write governing equations (Wallman is great - likes to talk you through this)
3. How does a pressure transducer work (bellows) (again, had some help from Wallman…..)

Justin Notestein

Prausnitz and Wallman

I started to describe my process. After discussing the first section, Prausnitz stopped me and said that my whole project was ridiculous. We talked about why it was ridiculous (formation of a low value product from a higher one) and then moved on. Discussed the carbon dioxide separation from process streams and the related formation of hydrogen fuel. Discussed membranes, pressure swing adsorption, and absorption. Discussed water gas shift reaction and steam reforming temperatures and pressures. Discussed cryogenic separation briefly, CO2 production, and other random associated problems. Prausnitz asked most of the odd little questions while Wallman tried to keep us on track. At the very end, Prausnitz briefly expounded upon the benefits of using nuclear power. Wallman quickly snuck in a controls question about the change in pressure in a condenser unit as the flow rate of coolant is changed. It was a pretty friendly room. At the end Prausnitz showed me pictures to see if I recognized any of my old professors.

Bernardo Da Costa

Iglesia and Lynn

They asked about my process design. Asked a couple of questions related to some of the decisions we had made in the design of the plant and if we thought the process (production of furfuryl alcohol from wheat straw) was commercially viable. After that Iglesia started asking all questions, whenever Lynn said something was to help me out, Iglesia wanted a car where you had steam reform and an explanation if the reactions were exothermic, endothermic => possible problems, he got a bit nasty in the questions, he wanted to know stuff like hydrogen bond length, so that we could choose a material to separate hydrogen from carbon monoxide.

Tim Logan

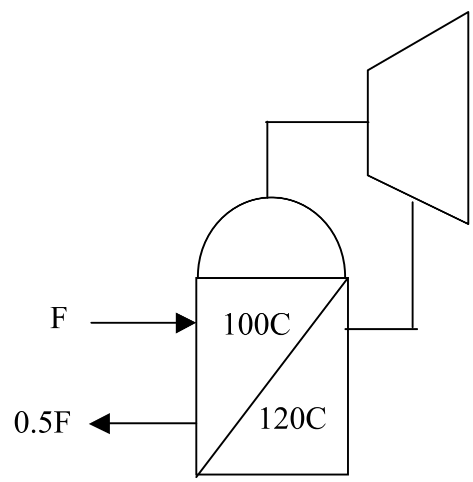
Prausnitz and Wallman

Prelims Questions 2002 (Compiled by Megan Ruegg)

This exam began with Prausnitz and Wallman asking me about my senior design project. My project was to design the fuel reformation system for an automobile fuel cell; basically it was about producing hydrogen gas from gasoline or methanol. There were several reactors in system including two water-gas-shift reactors, an auto-thermal reformer, and a preferential reactor. They wanted to know everything about each reactor and reasons behind the design choices I had made. It had been over a year since I had done/seen this project but I managed to make my way through it without a problem.

The production of hydrogen gas in my senior design project led them to ask me how to make hydrogen gas without oil or hydrocarbons. The answer was to use carbon or the electrolysis of water. A little tip on this one: it helps to know that France has a lot of nuclear reactors.

The next question was about an evaporator and included the following drawing (I don't remember the question):



They then asked for me to draw the H-S phase diagram and place the evaporator on it.

The last question was about removing VOCs from a long strip of plastic (think saran wrap). This was basically a stripper problem.

No "controls" questions were asked.

Overall these two guys weren't bad: it was the classic good cop-good cop scenario. I passed this one.

David Durkee

Lynn / Iglesia

Last slot of the day, and everyone was tired. They asked me about my design project, which they didn't like. Then made me set up controls on it (batch reaction). Then they wanted to make H2 onboard a car by air-liquefaction. I went through some separations involving distillation and membranes, and even adsorption for some reason I can't recall. This one went poorly due to my lack of interest and the hour of the day, but they passed me.

Vicki Demas

Keasling &Petersen

I had never talked to either before that day, but they were both really nice also. Professor Petersen spent about five minutes asking me questions about my background (because of the obvious accent). After the introduction they asked me where I went for my undergraduate and what was my senior project design. Even though my senior project was a process optimization they let me spend about 20 minutes describing it (I had to draw the flow diagram for it, and they had some questions about the economics). Then they concentrated in a part of the process (wastes), and we started talking about different waste management methods. Finally Jay asked me the well expected heated pool question: you want to keep the temperature constant, so what would be the best type of control to use. They also let me go ten minutes early.

Jason Bronkema

Keasling and Petersen

The first question was about my senior design project. After drawing a quick PFD on the board, they then asked me to briefly describe the process and they asked me a few questions about why certain equipment, temperatures, and pressures were used in the process. Then Prof. Peterson asked me about the production of ozone and silicon. After this, Prof. Keasling asked me to briefly explain the difference between P, PI, and PID controllers graphically and in words. Finally they asked how to remove trace amounts of benzene from water.

Adam Meadows

Keasling and Wallman

-Last one and the easiest. Wallman asked about my senior year design project but we didn't delve into it too deeply. This lasted like 5 minutes tops.

-Next Wallman asked me some stuff about a heat exchanger and its operation. I don't remember anything too specific, except that each part could be solved by conservation of energy or noting that heat flows down the temperature gradient.

-Finally Keasling chimed in and asked me how to remove an organic contaminant from ground water. I think there are good solutions to this problem in all the prelim study books (Use bacteria or activated carbon.)

Dewey Mair

Keasling and Peterson

Since this was my first prelim of the day I was very nervous but they eased my apprehensions by being kinda relaxed and smiling a lot. I suggest smiling a lot while explaining things because you give the impression that you're comfortable with the material and are confident in your ability to communicate technical information, which is what prelims seems to be all about. They asked me to first explain my design project, which went fine. Then they asked me how to remove TCE (trichloroethylene) from the contaminated ground water. Keasling explained that there is a thin layer of TCE (from detergents) that covers the floor of aquifers in California. I suggested just pumping it out mechanically but they said that was a bad idea. However, what is done in reality is an even worst idea. They pump contaminated ground water through activated carbon filters to remove the contaminant, basically a huge adsorption column. Peterson then asked me how to make silica gel industrially. I fumbled around and I got stuck on some basic stuff because he wouldn't help me out with the formulas in the reaction. Seeing that I was stuck Peterson prompted Keasling to ask me about controllers, which I had prepared for. He just wanted to know the advantages and disadvantages of each type of controller. No block diagrams, transfer functions, poles, zeroes, or any of that. Just qualitative answers. Keasling seems to like this subject.

Pat McGrath

Prausnitz and Lynn

I talked briefly about my senior design project. They asked some questions that were easily dodged by blaming everything on the problem statement. Q: "Why did you have two PROX reactors?" A: "Because the problem statement required two PROX reactors."

They went on the ask about a bunch of processes (separating oxygen out of air, Haber process, etc.) This quickly turned into another thermo exam (which I would have failed if it had lasted 40 minutes).

I passed all three exams, but I would have failed me if I had been grading.

Smita Agrawal

Jay Keasling and Peterson

This one started off in the standard way… Explain your undergrad design project…Then Jay asked me a standard controls problem.. I think it was which type of controller would u use to control a jacketed stirred tank reactor…Then I got the MTBE problem straight out of the prelims folder… what is MTBE.. What is it used for. Why has it been in the news recently… how would u remove trace amts. of MTBE from drinking water… and from then on, I don't remember how, but the questions somehow shifted towards Si compounds.. silicones.. polymers, zeolites etc.. this part is pretty fuzzy…

Björn Moden

<u>Keasling and Petersen</u>

Describe the senior design project. In the project, we were designing a plant to make HCN, so they asked safety and control questions every now and then. What happens when you start up the plant and don't have anything in the recycle loop? Will the HCN go where you want it to go? They were happy with the general description and the safety answers, so it felt like a good start.

What's MTBE? How would you clean up ground water that contains MTBE? Keasling had asked someone an MTBE question last year as well, so it's a good idea to check what questions that the people on your committee have asked previous years. It helped me out on this one (see 2001 prelims for more details).

How would you want to control the temperature of Keasling's swimming pool/hot tub? How can you increase the T rapidly? Basic PID things. What's a derivative spike?

How do you make silicon? I didn't know much at all, so Petersen tried to help me out a bit. Do you know what shear melting is? No. Didn't feel too good to leave when I couldn't answer the last question at all, but it went ok anyway.