Chapter 5 SOLN Video Case Transcript

SOLN-1A

[00:00]

Ms. Gallagher: All right, here's the plan. First of all if you have not yet taken the Unit V test you are overdue. So it takes me long enough to grade these things. You guys wait patiently while it takes me days and days to grade them. And then when I'm done, I like to give them back. But so 6/7 already got theirs back 'cause they had a different form of the test. So this 2/3 and 4/5, I'm still waiting for four people to finish taking the test.

<sighs, eye rolls, and comments under their breath>

Nick: Can we kick them out?

Ms. Gallagher: No. You've got until Friday and then I'll hand them back. I did hear quite a few people leaving the class after the test saying, "That was so hard." And then after I've looked at them, they actually turned out quite well. So most people did really well. That makes you feel good. I mean, if there was any part of you that was confident, I think it carried you through. All right, next thing…the workshop. The packet that you just turned in I would assume you could do. Because we went through two lectures and talked in a lot of detail about solutions and colligative properties, but we only did a few calculations together. Which ones did we do? What did we figure out mathematically? On the last day I saw you, which was a week ago.

Jack: To take from a solid and find a solution?

Ms. Gallagher: Okay, we did do some calculations with molarity, making solutions. We described how to make a solution from a solid, and how to make a solution if you started with a solution, and wanted to make it more dilute. What else did we calculate? Yes, Lynn?

Lynn: Um, vapor pressure.

Ms. Gallagher: Right.

[01:38]

Ms. Gallagher: Okay, if it does, you need to compensate for that in the molarity.

Sandy: I have one question. For the workshop, like the first question is write the dissociation reaction for all of those things, so how do you know, I forgot, how do you know if it dissociates or not?

Ms. Gallagher: Okay. The first question about whether or not it dissociates, where would you look? These are ionic compounds and we need to check...

Sandy: Look on the chart that you gave us.

Ms. Gallagher: Okay. We need to check to see whether or not they are soluble. Now how did you decide they were ionic?

Sandy: Oh, I didn't.

Ms. Gallagher: Okay, that needs to be a question too. Yeah?

Lynn: Ionic's a metal and a nonmetal. It's $C_6H_{12}O_6$ so it's covalent because they're all nonmetals.

Ms. Gallagher: All nonmetals. Good. So you look at the elements themselves. And that's how we've decided, those are the rules we follow; if they're all nonmetals, it's covalent. If it's a metal and a nonmetal, it's ionic. Then you need to check if it dissolves. If it does, that's how many ions it will break up into.

Sandy: So on the chart if it's under the soluble column, it will?

Ms. Gallagher: Yes. If it's ionic and in the soluble column, it will break into its ions. Okay? Now we're going to go over that workshop first thing next week. So you had the packet, you went through those example problems, and we've done some calculations together. We will go through the workshop at the beginning of next week. Yeah?

Lynn: Um, if it's slightly soluble...

[03:12]

Ms. Gallagher: Okay, you need your tape out.

<Passes out a project sheet and then goes into attached prep room.>

<Students chat about having or not having tape rolls. Some begin reading over the project sheet, but most are focused on taping it into their journals.>

<Kima enters with tie-dyed lab coat on>

Kima: Okay, good morning, I am here to introduce this project to you. I'm gonna be here today and Friday. So please follow along as I read through this. <Kima sits on front desk facing students.> Yes.

Jack: What's your name?

Kima: Kima.

Jack: Kima?

Kima: Uh-hum.

Kima: All right, it says, "What's the Solution?" Due to your ongoing positive record, regarding…

Jack: Aaaaahhhh.

<Jack realizes that this is a class project and reacts>

Kima: ...safety and quality control, your scientific community has been recommended to enter a contract competition.

Kim: Sweet.

Kima: At least six companies have been challenged by Solutions, Incorporated. The company that best completes the tasks will receive a lucrative contract with Solutions. The criteria are listed below. Task. Calculate the percentage by mass of each component of a mixture containing sodium carbonate monohydrate and potassium iodide. The only other chemical available for your use is 0.5 molar calcium chloride, which you must make on your own. The materials that you are allowed to use for making this solution are found on the middle lab table in the back of the room. That's it. Get this done ASAP. Read the bottle closely. That's what it should say "closely." Okay? So, to repeat that last part. The middle lab table. The materials to make that solution are located there. Everything's there that you need. <Half of students look back at middle table> Parameters. Number One: You will receive six identical samples of the mixture. Don't lose or destroy any of them. There are no replacements. So the six samples are up here in this bin. <points to bin and removes one sample out and shows it to the class> And when I say identical, it means that this mixture that was mentioned up under tasks, um, sodium carbonate and potassium iodide, it's the same percentage. So they might not be the exact same mass, each of the six samples, but it's the same percentage of the two different chemicals mixed together. Okay? So your six samples are in here. These are the samples that all of the products it refers to. <Kima points to project sheet.> You're trying to figure out something about those. Number Two: You are working as a company. You may use all room resources except the cart and other adults. Three: A list of materials you will need to complete this lab, other than the materials that already found on the middle lab table, must be listed on a separate sheet of paper and submitted to the lab manager, me, by the end of company time today. Be thorough. Not only should you think through every piece of equipment you might need, but be accurate in your description of it. For instance, don't just list "six beakers"; instead list "six 250 mL beakers." So, the list that you give me today of the equipment that you need to complete the lab. Those materials will be out on Friday for you. Okay? Number Four: You have today and next class period to work on this. If further lab time is requested, you must email me, Kima, at that email address. I will only provide further lab time if given 24 hours notice and if I'm is available. So if you think you're gonna need extra time, get your requests in early. I will only look at one email per company per day, so make sure you record your company block in the subject heading. I am here to help you and your company today and during the next company time. So the rest of the period today and on Friday. My purpose is to help with equipment and lab technique. But your company can only ask me five questions per day, so think about and formulate your questions well. I may refuse to answer should the response to your question give your company an unfair advantage over other companies. So think them through and ask them wisely. Hints. Number One: At a minimum, think about the words: double replacement reaction, net ionic equation, solution, solubility, precipitate, and molarity. Number Two: To aid you in your planning, here is a sample problem that is similar to the task asked of you above, but of course it uses different chemicals. Your company managers may ask me whether or not you have the correct answer at any time during this project. They can only ask me three times though. So do the problem. Check your work with me. Do the problem. You can only do that three times throughout the project to make sure that you're at least getting the sample problem right. Now these three checks with me are not part of the questions that I mentioned above. So you can ask me about the sample problem three times, this in addition to the above-mentioned five questions. And there's the example problem. I'll let you read through that. Products. Number One: You must give a maximum 10-minute presentation explaining your background, procedure, data, data analysis and conclusion to a Solutions, Inc. representative at the beginning of company time on Tuesday, the 28th. Now I'm

not the company representative that will be here. It will be somebody much higher up that I am. <Three-fourths of students, all of whom are looking at their project sheets, now look up at Kima.> Okay? Number Two. You must have professional-quality visual aids showing the above information. Visual aids should have minimal wording. You fill in the rest of the stuff verbally. If your visual aid is going to be a PowerPoint, Keynote, something like that, please send it to me by midnight the evening before. So Monday night you want to send me that so that it's ready for you on Tuesday. Number Three: Turn in a hard copy report of the company's background, procedure, data, data analysis, and conclusion. This is not simply a printout of the presentation. This is a report. Number Four: Your company managers may not be the presenters. They can and should be part of the planning. Presentations should be done by others in the company. Who you choose and the number of presenters is up to your company. Number Five. You will be assessed in three categories and they're listed there. So the company that does those three things and all of the subcategories involved with those three things the best will win the contract. So from start to finish, now until the end of your presentation on Tuesday, everything matters. Okay? And then at the bottom there are two other, um, science content questions that everyone in the room ought to be able to answer as well in addition to knowing everything else above, all of the science behind what you do in your experiment. So the six samples are up front. The materials for the solution are in the back. The rest of the criteria I just read. The rest of the time is yours.

SOLN-1B

[00:00]

Jack: Okay.

Kim: You guys, pumped for this? Yeah.

Jack: You guys remember CanCo. It was a lot of fun.

<laughter>

Kim: Great times, guys.

Jack: Okay, um, first you guys just want to kind of take a look...well, we took notes on stuff in CanCo when we talked about what we needed to work on or stuff that she looks for in some of these class competitions and assessments. So if you wanna turn back into, um, turn back into your journal. Just real quick and, you know, kind of remember how it goes.

Kim: Exactly, 'cause last time we got points off on our presentation because we didn't do a very professional performance. So this time all of us will dress up. We'll make it into a more presentable like atmosphere.

Jack: Um, can we have one person to write on the board real quick?

Kim: For safety.

Jack: For safety.

<Lynn goes up to the board.>

<Jack passes out Flinn catalogs to Craig and Joe.>

Jack: We're going to have to figure out six today.

<Jack and Kim talk quietly to one another at the front of the room while the students wait patiently.>

[01:32]

Jack: First, uh, we should find...what are the chemicals? Real quick. We'll write that down.

Kim: Right, um, sodium carbonate monohydrate.

Jack: What is it? It goes… I'm sorry, go on.

Kim: And potassium iodide.

Jack: And then what was I going to do…and oh yeah…

Lynn: We have to figure out…

Jack: We have to figure out…

Lynn: The equation and the…

Dan: Here's 0.5 molar calcium chloride.

Jack: We have to figure out the equation and then it goes precautions…it goes precautions…

Angie: Hazards and first aid.

Jack: Hazards and first aid? That's the only three?

Dan: What about cleanup?

Rita: Disposal.

Craig: And disposal.

Dan: Disposal.

Jack: Disposal? Alright.

<Jack and Kim talking with students waiting patiently>

[02:28]

Kelly: It doesn't say. It just…

Lynn: That's it? That's hazards?

Kelly: No. No. No. After that, it's…causes irritation to skin and respiratory tract.

Kim: Thanks, Kelly. We're gonna read out the task one more time so that in case people don't understand it then we can talk about it. Okay. Calculate the percentage by mass of each component of a mixture containing sodium carbonate monohydrate and potassium iodide. The only other chemical available for your use is 0.5 molar calcium chloride, which you must make on your own. And then that's the parameters. Okay. Kelly.

Kelly: We have first aid stuff if you guys want it.

Kim: That would be good.

Kelly: This site is really descriptive.

[03:17]

Kelly: Okay. I'm not certain what this means, but "Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility.

Mary: So we're going to have to put it in the fume hood.

Michelle: That's disposal.

Jack: Alright you guys, real quick, as you go down to the "hints" there's an example in bold. So we're gonna have you guys, we're gonna have you shift into groups right now and we're gonna work on the example just so that we can be working on the board and….

Debbie: What about safety?

Craig: We're not done with safety.

Jack: Yeah?

Craig: We're not done with safety.

Jack: I know. They're gonna go with the safety and we're gonna get this done. And as soon as we're done, we're not gonna go into the lab before we know the safety.

Lynn: Well why don't I just go back there and I can write it all down?

Jack: Yeah, that's a good idea. Okay, so let's shift into groups.

Kelly: Wait, am I done with this?

Robert: No, uh, we're working on the equation.

Kelly: I know, but should I just turn this off?

<Lynn walks back to Kelly with her journal and begins copying safety information from website.>

<Over the course of one minute, groups one-by-one begin to shift their desks so that they are facing one another. Groups begin working on the sample problem. Kim, Jack, Nick, Craig, Lynn, and Kelly continue to work on the safety.>

[04:31]

<Kima walking around the room observing, looking over students' shoulders, looking at their journals, but not speaking with students.>

Sandy: Well, it makes sense because like salt it's sodium chloride. So, silver chloride, I don't know, they're probably similar.

Angie: HCl?

Debbie: Yeah.

[05:00]

Jack: Adam, will you come here real quick?

Frank: Adam, tell them, please?

Kim: What did Frank want you to say? What did he say?

Adam: Well, he said we're wasting a lot of time just sitting in groups.

[05:28]

<Angie talks with Robert and Maria.>

Angie: I don't understand because there's three reactants.

Maria: Yeah.

Angie: And we don't know how to find products for three reactants.

Maria: And it's a double replacement reaction.

Angie: She gives us a hint it's a double replacement, but like Mary thought...Mary has written down that silver nitrate plus hydrochloric acid yields whatever because they give us...

Maria: ...that it's a double replacement.

Angie: Yeah, they give us the thing, but the silver chloride or whatever, but you can't just take the potassium nitrate out.

Maria: Because it says that it's added to the mixture.

Angie: Yeah. So I don't know.

Maria: Glad we established that.

<Angie moves and talks with Irene and Tom.>

Angie: Did you guys find an equation?

Irene: Silver nitrate plus hydrochloric acid gives silver chloride.

Angie: Yeah, that's what Mary got too, but I don't understand how you can just eliminate potassium nitrate out of it. Do you have any idea or did you just take it out of it?

Irene: No.

Angie: 'Cause that, what Mary has, like it makes sense 'cause we have the precipitate as silver chloride or whatever.

<Kima takes another walk among the groups. When she walks by the group with Robert, Maria, and Rachel's group, Robert asks her a question.>

Robert: Is it possible that one of the chemicals in the equation doesn't react?

Kima: Yes. That's one of your five questions.

<Kima walks away from this group after this statement. Maria looks at Robert and they laugh.>

Angie: Why is it there? Why does it have to be there? Can't we just take it out?

<Angie realizes Kima has been watching and laughs.>

Angie: 'Cause I just I don't know. 'Cause I like what makes sense in my head is the three reactants or whatever...that's what I get from the word problem. Apparently there can't be three reactants 'cause she says double replacement. And we don't know how to find products for three reactants. So, I don't know.

<Angie moves to group with Karen, Mary, Michelle, and Patrick.>

Mary: But all nitrates are aqueous...'cause if we know the molarity of this, we can figure out...

[07:58]

Frank: It's not only about the hint problem, it's about everything else. You gotta remember that we need the materials and we need to make the mixtures and we need to talk about what we need for Friday.

Jack: Well, we, um, you guys are having ideas...

[08:15]

Sandy: Um, for the sample problem, is this answer and this answer, are they right?

Kima: This answer is correct.

Sandy: That's correct.

Kima: This one is not.

Sandy: That's not correct.

Kima: You cannot start with any information that you found out after the experiment was done. So both your 4.15 and your 3.5 are numbers that were determined based on results from your lab. So the scientist did the lab, found the precipitate, massed it, and all that stuff. The question is asking you, at the beginning of the lab…

Sandy: Oh, because you can't…

Kima: What should the chemist figure…how is this chemist going to figure out what volume to use in order to make sure all of the substance precipitates out. So you can't use either of those numbers to do the second part of the problem. But that one is correct.

Sandy: Okay.

<Sandy looks for Jack or Kim.>

Sandy: Okay, where is?

<Sandy goes over to Kim.>

Sandy: This is correct. This one is I did wrong.

Kim: Do you know what you did wrong?

Sandy: I think so. Okay, 'cause like, for the one for the milliliters, you can't use the numbers that you got after the experiment's done because that doesn't make sense. I don't know how you know how to do that, but before the experiment is done, you have to determine how much you need of the HCl, otherwise like it's the only way you can do it. So basically you have to figure out, um, how much you need. Ooooh.

[10:11]

Lynn: Um, guys, write...this is the safety for the reactants and calcium chloride.

Kelly: What does 26A mean?

Lynn: That's the disposal.

Jack: Wait you guys. Real quick. Just hang on.

Lynn: But, anyway, just write everything down. We need everything.

Joe: Could you guys move over a little?

Angie: We should just take 10 minutes right now.

Lynn: And if someone has figured, I'm gonna work on it, but if someone's figured out the products, then 'cause we need to figure out safety precautions and first aid for the products as well. So...

Sandy: And after I'll explain part of the example problem.

Jack: Get this down right now.

[11:03]

<Before segment on film, a student worker came in with notes for students. She walks over to Kima who is sitting at front desk and hands her the notes. Angie gets Jack's attention and he walks over to Kima.>

Kima: These came. I don't know who they are.

Jack: Maria <hands her a note> and Nick <hands him a note>.

Mary: Wait, is CO3 the precipitate? <looks at chart> Carbonates, oh, I wonder if. Calcium carbonate.

Kim: There you go.

Mary: Yeah, so calcium carbonate has to be what it is.

Kim: Yeah, there you go.

Mary: Okay, so, I'll just figure it out.

Kim: Sorry.

Mary: One thing I can do: reactions. I'll figure this one out.

[11:49]

Kim: The other classes also divide it, 'cause I was talking to their managers. 'Cause they just give people, certain groups, different parts of the lab report to write, and then one of the managers, compiled it all together and then printed it out.

Jack: Okay.

Kim: I mean...and then you can always have some attachments if they want to and stuff like that, but I think that'd be the most effective way and efficient.

Jack: Okay, so we're gonna...we have six groups, right?

Kim: Yeah.

Jack: Alright, and we gonna have six people doing the lab report...

[12:23]

Jack: Okay, guys, could everyone listen up real quick? Alright, first, we wanna tell you what the plan is for right now. What we were thinking is we're gonna prepare everything for tomorrow...

Kim: Friday.

Jack: ...for next, for Friday. Friday we're going to do a big lab day. So for this class and the rest of class, we're gonna talk about the materials, if we missed anything, and we're gonna turn it in.

Kim: Yes, we're gonna do that.

Jack: Yeah, and then also we're gonna…getting all this discussion so that everyone understands...one, they have the safety in their books as well, just first, and they understand how to do the equation, and they understand what's going on in lab, so that we're all ready for, we're all ready for the lab the next class. And we're gonna get right away.

Frank: We also gonna make the solution.

Jack: Yeah, we need some volunteers to make the solution just for tomorrow so that we're absolutely all ready for tomorrow.

Kim: Friday.

Jack: For Friday. I'm sorry. I keep saying “tomorrow.” For Friday.

Kim: No that's fine.

Jack: Can we have some volunteers to make the solution?

Craig: We have to calculate it.

[13:20]

<Adam walks up to Kima.>

Kima: Uh-hum?

Adam: Um, is this the answer to the second part?

Kima: Yes, it is.

Dan: Oh!

Sandy: Is it right, Adam?

Adam: Yeah.

Sandy: Oh, we are so smart.

Michelle: Nice job, Adam. <high fives>

Kim: Nice.

[13:44]

Sandy: While she's writing, I'll explain.

Kim: Right now? Yes.

Jack: You guys, listen up to Kim real quick.

Kim: Okay, guys, can everyone please be quiet except for the...so, guys, over their typing, go ahead and do it. If you would all come and listen to what Sandy’s gonna explain because I think right now she's the only one who understands what we're doing.

Mark: Sweet.

<laughter>

Mary: No, face this way <to Dan holding whiteboard>

Sandy: All these boards are written on!

Mary: Dan, Dan, turn around.

Kelly: Dan.

<turns around to face class for a second and then turns back again>

Kelly: Dan, oh my God.

Sandy: For this equation, honestly, all the other things that we've done, you have to find a balanced equation for this lab so the products, so when you read it the mixture is silver nitrate and potassium nitrate. This is potassium nitrate, silver nitrate, um, and then it says to isolate silver with excess 1.5 molar hydrochloric acid. I think that's what it is, HCl. So all these three things are added together. That yields, um, it says there's dry AgCl precipitate so you know that the solid formed is AgCl and since it says somewhere in here to focus on double replacement reactions. Then you know that somewhere there's a double replacement reaction. So we used one of our questions to ask about, um, the two things that are in the mixture and, alright, and we found out that the potassium nitrate stays the same so it's…it just doesn't react with anything, but these other two do, so it's double replacement. So that's what you get. And you know that you form 3.50 AgCl 'cause that's what it says. So if you put that...if you change that into moles, then use the balanced equation to find the moles of AgNO3. And then...

Mary: Okay, why isn't the bottom one AgCl?

Sandy: Wait, yeah, I didn't finish it. Sorry.

Kim: I was rushing you. Sorry.

Sandy: Anyways, that's not what you do, but then you put it into grams, then you get...No!

Kelly: The bottom should be AgCl.

Sandy: Oh, yeah, this is AgCl. Well, anyways...

Mary: Well, write it. Erase it.

Sandy: And then you put it into grams. So 4.15 g. Then you just divide by five grams because that's the initial quantity that you have. You multiply that by 100% and you get 83% AgNO3. So then that's only the first half of the problem. Oh, and that's the right answer, by the way, we checked. That's only the first half of the problem because it says...

[17:00]

Angie: This is a list of all the stuff that we have written down, and we also have some obvious things like textbooks and journals. Does anyone else have anything that they think we should add?

Kelly: Two magnetic what?

Angie: I don't know. I didn't write it.

Kelly: Sisters?

Mark: Stirrers.

Angie: I believe it's the professional name.

Mark: Stirrers, like...<mimes stirring>

Kelly: Yeah, I know. Stirrers.

Angie: So does anyone else...

[17:29]

Joe: Kima, if I make the $CaCl_2$ solution today, will it stay in the proper state by next class?

Kima: Uh, I can give you a lid. Yes.

Joe: It will?

Kima: It will be fine.

Joe: Okay.

Kim: Okay. Sweet!

Dan: Such a horrible question.

Angie: Rita, you don't have to write this down. You can if you really want to, but like, you don't have to.

[18:10]

Angie: Does it say that it has to be typed, the list?

Mary: You guys, you have two minutes, you have to give it to her.

Jack: No, we were just trying to be professional, whatever, we'll just write at the bottom. Real quick, you're just gonna write the "textbook."

Frank: But we're bringing those.

Jack: I know. I know.

Frank: I said permission to access class materials.

Jack: Alright. Is that okay?

Kim: Yeah.

Jack: It's good and classy. Turn it in?

Kim: Yeah.

<Jack hands list to Kima.>

Frank: I could have made it a little more classy and used like British subtexts, but I didn't.

[18:46]

<Craig massing out CaCl2 with Joe and Nick watching>

Joe: Uh, that's close enough.

[18:58]

Nick: Yo, we got it. Got it.

Joe: Terrible idea.

[19:12]

Joe: And it's done. No, a little more.

Craig: That's good.

SOLN-2A

[00:00]

Jack: And then we have, um, it's gonna be Mary's group, which is right here. Oh, I'm sorry. Patrick's not gonna be here so you have to get in touch cause he has strep. So I'm just telling you. You guys are doing data analysis. That's…you know, you can look in your notes about that if you are unsure, um, yeah, look at the lab report sheet. And then, um, the error analysis is Lynn's group in the back. And then the questions and conclusions, I'm pretty sure is my group, right back there. I'm pretty sure. Also, real quick, we're also gonna need three volunteers, we're gonna have a little committee of three or four people to go over the aspects of like the food, you know, possibly the name of the company, all that. So can we have volunteers for that? You're gonna have to, you know, it's a big part, because that what's differentiates us between the other classes. So you know that going to be the business cards and everything. So it's gotta look good. So we have one, two, three, four, five people.

Frank: We already have a company name.

Angie: Wait, when are we going to do this?

Jack: Huh?

Angie: When is this?

Jack: You're gonna have to…you're gonna have to make time.

Angie: Meet together.

Kelly: Over the weekend.

Angie: And, why do we, like on Sunday at 12 noon when everything's due...like where is that due?

Kelly: To who?

Jack: Sunday at 12? That's gonna be and email probably....Kim. Kim.

Kim: Yeah.

Jack: Do you want it for everything in the lab report probably gonna be emailing it to one person? Do you wanna just do it?

Kim: Right. Can you email it to me?

<Bell rings>

Kim: Yeah, because what we are thinking about doing is at around like 2 o'clock in the afternoon Sunday, we're gonna compile it up together and we're gonna create our PowerPoint presentation and we're going to work on our presentation.

Angie: Who's gonna do that?

Kim: Alright. So this is what's going to happen. Um, Jack and I were talking about it last night and we're going to need some volunteers for this project.

[01:53]

Kim: Okay, sweet. Um, right now, while we get some volunteers, can there be one person from each group to go back to the lab and weigh one of their dishes in their individual groups. So one person from each group. This is part of the lab and Sandy's going to explain how we put it into an equation.

Jack: Remember goggles and then scoot the chairs.

Frank: I'll scoot chairs. Up, please. <to Tom>

Jack: Um, we had five volunteers…

[02:27]

Kim: Uh, guys, just a second. Okay? For Sunday, um, remember that it's mandatory that you have to be there. So two people have to be there. You can have more, but at least two people from your group could go. I understand if there's schedule conflicts, but could you please tell me beforehand that would be great. Okay?

Joe: So, of course, almost half the class is gonna be there.

Kim: Yeah.

Mary: What time is this happening?

Kim: Around 2 o'clock.

Joe: So how are we going to get together? Are you going to call us or…?

Craig: Her house <pointing to Kim>

Kim: My house.

Joe: Okay, 2 o'clock?

Kim: Yes.

Lynn: If four people from your group can be there, can they come?

[03:07]

Craig: We're all going back into the lab at one point.

Jack: Wait, let's just, do you want us to get to work?

Kim: Alright, well, we need to find out how much to add...

Craig: Of the CaCl2?

Kim: ...of our stuff last time, 'cause right now what Sandy's doing is she's checking out the equation so that we can just plug in the mass.

Sandy: Can you ask if anyone worked on the equation?

Jack: We gotta give everyone some jobs to do.

Kim: Yeah, alright, guys, alright, did anyone work on the equation for the actual lab over the past few days? <Silence> No?

Lynn: I've looked at it.

Jack: Just in case, you know, you were bored...and then it comes time to freak out <sarcastically>

Mary: I have the equation.

Kim: Sorry, I can't hear, Mary.

Mary: I know the equation.

Kim: Do you know it? Okay. Mary, can Sandy check with you quickly? Also, guys, does anybody remember the temperature for the oven from the last lab? Is it on one of the lab sheets?

Kelly: 145.

Kim: For the oven in there?

Jack: Are we just going based on the last lab?

Kim: Well, that's what we needed to dry it out.

Kelly: Sorry. That was the first thing that popped into my head.

[04:17]

Joe: Okay, how many questions do we have?

Craig: We asked one, right?

Kim: We asked one.

<Sandy walks to Kima's desk.>

Sandy: Um, I'm just wondering when I looked up online sodium carbonate monohydrate, it's listed as $Na_2CO_3*H_2O$. But I wasn't sure since, well, we haven't really or maybe we have, but I just don't know. Since there's three products, um, we thought that H_2O would just be added at the end, since, um, it doesn't really react with anything?

Kima: So, show me the two chemicals that you think react. Point to them.

Sandy: I think that Na_2…I mean I think that it's a double replacement reaction between, um, I think Na_2CO_3 and CaC_{l2} would form $CaCO_3$ and Na_2Cl.

Kima: So, this part of it in your textbook is written like this, as a solid, but are you going to…is this reaction going to occur when this is in a solid state? Is that your plan for this lab to have this and this be in the solid state when they react?

Sandy: Um, I don't know.

Kima: Come back when you have an answer to that.

Sandy: I think that these have to be…

Kima: Are you asking me another question?

Sandy: No.

Kima: Okay, go answer my question and then come back.

Sandy: Okay.

Kima: Are those two going to be in the solid state during the reaction when you do the lab?

Sandy: Okay.

[06:28]

Sandy: <to Kim and Debbie> It's already taken out of the solid.

<walks over to Kima>

Sandy: I'm answering your question.

Kima: Okay.

Sandy: I hope I have the right answer. CaCl2 is a liquid. It's an aqueous solution.

Kima: Okay, it's a liquid or it's an aqueous solution?

Sandy: It's an aqueous solution; it's not a liquid. It's really ions in water.

Kima: Okay.

Sandy: This is a solid.

Kima: Is that the way it's going to be when it reacts?

Sandy: After or before the reaction?

Kima: During the reaction. Is that the phase of matter that it will be in when it's reacting?

Sandy: It's going to be in...

Kima: What are you going to do with this?

<Sandy walks away and goes to talk with Kim and Debbie.>

[07:31]

Dan: Everybody says that's right, but I think that he makes sense, so we each gotta boil ours…

Joe: I really think that if it still has all the water and it goes through a filter it's not going to be positive.

Dan: But it will if you boil all the water away.

Joe: You've gotta boil all the water away. They're wrong about the filter.

Michelle: I think it's a good idea. We should do half one way.

Joe: The filters aren't gonna work.

Michelle: Why don't we do half of them one way?

Joe: Here, you know what? How about we look at an ion chart? If the filters wrong period, and if they don't…

Angie: Does anybody really know? Raise your hand if you know.

<A few hands go up.>

Lynn: Wait, we have to figure out the…

Angie: ...equation.

[08:22]

Jack: Kim, are you guys making progress or…? Lab. Lab. I know that we need the equation, but we don't know how long it's going to take.

Lynn: But we don't have the equation.

Jack: I know. I know.

Sandy: Okay, we do not want this to be a solid during the reaction.

Kima: Right. You want it to be in what phase?

Sandy: In solution.

Kima: Right, so it's also going to be aqueous. So this won't matter.

Sandy: Oh. Okay.

Kima: This…this…those hydrates are in the solid phase.

Sandy: Ooooohh.

Kima: So if you're going to focus on the two substances that react in an aqueous solution, then it's this and this.

Kima: So that's it.

Sandy: Okay. Thanks.

[09:23]

Dan: So what we're saying is like this <pointing to filter> is not fine enough, if there's even such a paper fine enough, to break away ions and trap them in here <pointing to filter> from the water molecules whereas if we boil it we can like dispel out water by evaporation and then we'll be left with the salt for sure. Whereas we might, there's a maybe we'll be left with sodium, there's a for sure that we'll have salt if we boil it.

Frank: I like that idea.

Tom: But boiling's going to take a long time to evaporate it all completely.

Frank: But we're not having the reaction happen by adding water. Are we? The only water that is left is from our solution <pointing to volumetric flask on middle lab table>. We're just adding solute into it.

Dan: Aren't we all just taking a little bit of this for each group?

Frank: Yeah.

Dan: Right now, our goal is to pour this in there and hope that when it goes through that we're left with solute on the paper, right?

Frank: Yeah, but I don't think that we should do that.

Tom: I wouldn’t worry about salt getting through this filter. I mean you can see a grain of salt, but you can’t see the holes in this filter.

Joe: Salt can’t be filtered because it will come out eventually. I haven’t found it yet, but…

Dan: So CaCl was mixed with…

Craig: Water.

Tom: And salt dissolves.

Joe: It won’t work with the filter paper. It’s bonded to the…

Mark: Then let’s evaporate it.

Joe: It’s bonded to the water. It won’t break apart.

[10:56]

Kim: Okay, everybody, all the boys at the back lab table, can you please come back here and reconvene? 'Cause Sandy's gonna go over the equation and explain it.

Sandy: It's not Na2Cl.

Jack: Yeah, but we need an answer for all six of them.

Kelly: How many questions do we have left? Let's ask her. Jack.

Jack: Huh?

Kelly: How many questions do we have left to ask Ms. Gallagher?

Kim: Three more.

Joe: Can I ask her one?

Jack: No. Oh, wait. No, no, no. I'm sorry. I was talking to her. She was like just saying, "Can I ask her how many we have left?" No, because that would be another question. Now what did you say?

Joe: I want to ask her if a solution can be filtered. If it's possible. If it's not, then we know that we can't do that. Is it okay if I ask the question?

Kim: Yeah.

Jack: Then we have one more. See if she tells you.

Kim: Wait, that’s another question.

Jack: No, don’t ask, don’t ask it. Just go, go…

Kim: Just ask your original question.

<Joe approaches Kima at her desk.>

Joe: Um, can a solution be filtered with filter paper?

Kim: <continuing to the rest of the class> Ok, guys. Alright, Kelly…sorry go ahead…For everybody that was set up in the back, once we get equation down then you can just go back and plug everything in to do it.

Kima: <repeats question slowly> A solution be filtered...?

Joe: Could you filter out a solute from the solvent with the filter paper?

Kima: No.

Joe: Possible?

Kima: You need to look that up again. You and your company should look that up again.

Kim: Ok, good…alright… Sandy's going to tell us how to figure out how much we're supposed to add to do this, okay?

Joe: <walks away and returns to seat> I got no. So sad.

Angie: Wait, Joe, what did you ask?

Joe: If you can filter a solute out of a solvent.

Jack: Joe, then plug in the hot plates, right?

Dan: I mean we kind of should have seen that coming. There's hot plates out.

Frank: That means we have to boil it.

Mark: 'Cause we had asked for hot plates.

Dan: What?

Mark: We asked for hot plates.

Kim: Did we? Good.

Dan: Good.

Mark: Right? We did, right? We asked for hot plates.

Kim: Sweet.

Frank: Yeah.

[13:05]

<Sandy writing at front whiteboard>

Kim: Debbie.

Debbie: I found two problems with that equation.

Kim: You found what?

Debbie: Two problems with that equation.

Kim: Hey, Sandy, Debbie says that she's found two problems with your equation.

Debbie: How is it 90 g of Na_2CO_3?

Sandy: What?

Angie: Why don't you go up there and talk to her?

Sandy: I'm sorry. I can't hear you.

<Debbie joins Sandy at the board>

Debbie: But you said it's 90 grams of Na_2CO_3. Two Na, this is 46.

[13:53]

Mary: Sandy, what did you get?

Sandy: What?

Mary: What was your answer?

Sandy: Well, I haven't done that yet, because I don't know the mass. Okay guys, this is the equation for the lab. Na_2CO_3, that is...

Mary: See the thing is though, like what we measured was a combination of the sodium carbonate and the potassium iodide.

Sandy: Right. Um, yeah, it's supposed to be that way because you can't assume how much it's gonna be of each thing, like what the percent of each compound or whatever in the mixture is before you do the experiment. So you have to take the mass of the whole mixture, but you only okay… for the sample lab, at first, for the sample lab when we had to do the same thing. It said to ask what you got, how much, what the volume in milliliters of the solution was added to the mixture. So at first I did the 4.15 g, which is how much I knew, which is the mass of one of the things in the mixture. But that gave me the wrong answer. But when you do, what the mass of the total mixture in the sample problem was 5 g, so when you use 5 g as the mass when you do all the multiplying stuff, you get the right answer. 'Cause you can't assume how much there is before you do the experiment.

Angie: So that's what we did in the example problem and we got it right? Right?

Sandy: Right.

Angie: So that's what we should do in the real thing.

Kelly: So what do we plug in there, did she say?

Angie: Are we plugging in those masses there?

[16:05]

Kim: Okay, so does everybody realize that you have to plug your group's...

Angie: Wait, you guys, everybody listen.

Kim: You do realize that you have to plug in the mass of the individual group's mixture into here, right? Okay.

Angie: And each mass is up there in order.

Mary: Let's all answer the first one and do it together. 1.42.

Sandy: Okay, because for the mixture, you don't know, there might… So we'll use this, 1.42. Okay? So you don't know, that's the mass, so you don't know if 1.4, you could have 1.41 g of Na_2CO_3 and only .01 gram of potassium iodide. You don't know how much there is until after the experiment. So you just take the entire mass, and then you put that and change it into moles, then you put it into moles of CaCl2, you should already know how to do that by now, then you want, then you do one liter over .5 moles, 'cause it's a molarity of .5, then just change it into milliliters because milliliters is a little bit, you don't need liters.

Angie: So each group right now should be filling in their own mass, into the equation.

Mary: It should be somewhere like about 28.

Angie: Yeah, I got 28.9.

[17:55]

Sandy: Does everyone understand this?

Students: Yeah.

Craig: Yeah, we have plenty of solution.

Sandy: So when you go back and do the lab, this is how much of the solution that you want to add to it. Okay? Okay.

Kim: Alright, does everybody understand what they're doing?

Jack: If you don't, go to someone, okay?

Joe: No, just explain it.

Dan: Don't waste the time.

Joe: No, just explain it.

Kim: Okay, don't mix it in an individual beaker like we did last time. Big mess. Do it in the filter, okay?

Sandy: Are we washing it before?

Kim: That's what we did last time.

Sandy: Wait, I don't think we can do that 'cause won't some of it like get trapped?

Angie: That's what everyone did last time.

Kim: Yeah.

Angie: And when we tried to make it in the beaker first and then pour it in there was some excess…

Joe: Last time it wasn't dissolving. It was a precipitate.

Frank: No we're mixing it in a beaker. In the same beaker that we're boiling it in.

Kelly: Guys, I don't know if we should just do it in the filter.

Angie: Let's decide on something now…

Kelly: 'Cause think about it. A filter absorbs a liquid. Unless you poured instantaneously and none of the liquid gets soaked in before it reacts.

Sandy: You have to do it in the beaker because the filter will absorb some of the salt already and that would not be good.

Kim: We could always maybe dry it out.

Angie: How are we going to make sure all the solution in the beaker gets…

Kelly: I think… wouldn't deionized water be okay to wash out the beaker and pour more in?

Joe: We've gotta figure out the procedure, and you've gotta tell everyone what they have to do.

Frank: 'Cause not everybody, not even myself…

Joe: I don't know what I'm doing.

Kim: Okay. So, Joe, what you did is you asked Kima if you could filter out the solution. Alright, that's what you asked, right? Did she say "yes" or "no"?

Joe: Ah, no, you can filter out the precipitate, and the precipitate is $CaC0_3$.

Kim: Okay.

Angie: Is that what we're looking for?

Joe: Uh, what are we looking for? Are we looking for the ratio of the…

Jack: We're trying to find the percentage of each component.

Angie: Each?

Joe: Is that from… oh, that means we're looking for the precipitate?

Kim: Yes.

Joe: Are you sure?

Angie: Guys, I'm pretty sure it does. So how are we gonna do it? Are we gonna do it in the filter paper or in the beaker first?

Frank: We're not using filter paper.

Angie: Okay.

Frank: We're doing it in one beaker and then we're gonna boil it off.

Sandy: And you can use those things with the rubber things to scrape it out. They may not be back there.

Joe: So we want to find $CaCO_3$, NaCl and Kl. Okay, well, we can find $CaCO_3$, but NaCl and KI, they're both still gonna be in the water.

Kim: Right.

Joe: After we boil it away, we'll just get a mixture of both substances.

Angie: Do we have time to boil?

Dan: So what do you have to do, filter it and then boil it?

Student: We have 45 minutes left.

Sandy: Should we just put it in the oven?

Mary: You guys, the calcium chloride is a solid.

Dan: Is one of them magnetic?

Frank: Yeah, we have magnetic stirrers.

Joe: Are we supposed to just find the mass of the reactants or the products?

Kim: Alright, I think that's a great question.

Sandy: And then you want to find the mass of the precipitate that's formed.

Mary: How about we look at the sheet?

Kim: That's a good idea.

Angie: Do you want me to read the task?

Kim: Yeah.

Jack: You guys wait, listen up.

Angie: Okay, the task is, to calculate the percentage by mass of each component of a mixture containing sodium carbonate monohydrate and potassium iodide. The only other chemical available for you is 0.5 molarity calcium chloride, which you must make on your own.

Mary: So are we gonna…if we…we'll catch it in the filter…the calcium chloride…and then what you boil off the potassium iodide will be left.

Kim: So you need to do both of them.

Mary: Yeah.

Sandy: I don't think we should boil it because we have never done that before and we don't know if it will work.

Angie: We have never boiled.

Kim: …which is a good point because we don't have much experience and we could mess up.

Angie: But what would we use instead of boiling?

Kim: Huh? That's a good question.

Maria: Okay, so we're…if we're filtering out the precipitate… and then we have the sodium chloride and the potassium iodide left and we boil it off… why would the potassium iodide and sodium chloride like…how do we know which one…?

Kim: That's the thing with boiling it. We've never done it before.

Maria: We'd still have… wouldn't we still have a mixture in the beaker?

Angie: Okay, guys, there's a question about boiling. We don't have any experience boiling.

Joe: Listen, guys I don't think it makes a difference. We can filter out the CaC03 and that will get rid of one substance. We'll know the mass of one, but then we've got two substances that we don't know the masses of and they're in water. Even if we boil it…

Dan: They're still sitting together.

Angie: There's still two.

Kim: Wait, Debbie, what were you saying?

Craig: Yeah, what were you saying?

Debbie: It's a matter of stoichiometry <class turns to face her>. We take the mass of the $CaC0_3$ that we found and then convert it back into the reactants.

Kelly: I don't think we need to boil it.

Nick: She's right. She's right.

Dan: She's gotta be right! She's gotta be right!

<laughter>

Dan: We don't have enough time for her to be wrong!

<laughter>

Kelly: Alright, then let's go do it!

Maria: We did that in our other lab. We took the precipitate and converted it back to the reactants.

Sandy: Let's take a vote.

Dan: There's no vote! She's right.

<laughter>

Kim: No. I think I agree with...

<overlapping conversation>

Kim: Alright guys. Okay.

Mary: Are we putting and mixing it and then filtering or are we just filtering it?

Kim: So that's…alright are we mixing it in the beaker before we put it in a filter?

Sandy: Yeah.

Kim: So the procedure is going to be that you're going to mix your individual group's…

Joe: Ooooh!

Kim: You're gonna mix the individual milliliters of the potassium chloride with your mixture, okay? You're pouring it in a separate beaker. And then you're going to filter it. And then from there once you get the solid and you're able to find the mass then you're going to use stoichiometry to find out the mass of the other two.

Angie: And make sure you get that.

Dan: Run!

Kelly: So we're putting it in the oven.

Kim: Yes, we have to put it in the oven.

Joe: Okay, so we get the CO_3, stoichiometry will get the Na_2…then with the Na_2 we'll get the…

Sandy: I know how to get the mass of it. Is that what this is...wait…we just have to…I thought that we were arguing if we're boiling it or ovening it.

Kim: No, no, no.

Kelly: The boiling was because we wanted to separate…

Angie: Do we know what we're doing?

Jack: We're talking so much…we gotta go…

Mary: We have to go to lab.

Angie: We gotta go.

Kelly: Measure the filter paper!

<Students stand up quickly and head into lab area.>

Sandy: When we get it, I know how to figure it out, I just though we were deciding whether to boil it or oven it.

Kim and Sandy: Bake it!

Kim: Well, we still have to bake it. So we need 20 minutes for that.

<all students in lab area>

Kim: We'll explain. Okay guys, leave at least 20 minutes. We have to have 20 minutes for it to go into the oven, okay?

Frank: 25.

Jack: Be very productive.

SOLN-2B

[00:00]

Angie: Okay, so what else are we going to need? What else are we gonna need besides...?

Kelly: Um...

Angie: Okay, but tell me what this is.

Kelly: HCl.

Angie: HCl, okay.

Kelly: I mean, I mean, I mean...

Rita: We don't have HCl.

Kelly: KI.

Rita: KI? Potassium Iodide.

Kelly: I lied. This is CaCl2.

Angie: Okay.

Rita: This is?

Kelly: This is. This is 0.5 moles of CaCl2.

Angie: Okay, wait. And then what are we doing with this?

Rita: Um.

Angie: Is this what we're putting in there?

Rita: Is that, um, is that...is that potassium iodide?

Debbie: Where are all the beakers?

Angie: We're just gonna use this.

<Angie moves to nearby group.>

Angie: Wait, is this potassium iodide?

Mary: And, um...

Angie: Potassium iodide and monocarbonate thing?

Tara: Sodium carbonate monohydrate.

Rita: It's both of them together?

Angie: Um, yeah. That's like why we were like, "How are we gonna boil 'em off?" Like we're still gonna end up with two things. So this is...I need to make my drawings for this thing.

Kelly: 20.

Debbie: Where are all the beakers?

Angie: We don't have 'em.

Debbie: We didn't ask for beakers?

Angie: We did. We asked for all different sizes.

Rita: Do we know what's the mass of this? Is that the 28 point...? Is that the 1.42 g?

Angie: 1.49.

Rita: Oh. 1.49 g of Na_2CO_3 and KI.

Kelly: Okay, so now we have to put point...

Angie: Wait. I have a question. We're mixing it in here first and then filtering it into what?

Kelly: Into, uh...get another beaker.

Angie: Are you guys mixing it in here?

Rita: We need to put this in here?

Kelly: Yeah, make sure all of it gets in and none of it gets on the side.

Sandy: Did you guys already use this?

Kelly: Yeah.

Sandy: Are you done with it?

Kelly: Yeah.

Rita: Do we have a stirrer?

Kim: Do you guys have the...uh, no you don't.

Jack: Wait, you guys, if, you guys, right now if you're not, if you're like waiting and stuff, talk with your group about when you can meet 'cause you know the lab report's due at Sunday by noon. Okay, so talk about your schedules.

Kim: Decide who's going to be the people writing it and who's going to be the editors, okay?

Jack: Multitask, people.

Kim: Right.

[03:31]

Angie: So we're just putting it in there? We don't? Okay, we sure?

<Kelly pouring solution with precipitate into filter/funnel assembly over a test tube>

Angie: I really don't think it's a good idea.

Tara: That's what I was saying.

Kelly: No, it's fine.

Tara: I don't think that we should have put it into a beaker.

Angie: Look at all that.

Kelly: You're not supposed to put into the filter though.

Tara: I think that we should have put it into the filter, all together first.

Kelly: Okay, a filtering is to filter something out. You don't pour the reaction in there. You don't make the reaction happen in there.

Tara: I know, but then there's precipitate left in the beaker.

Angie: Look at that.

Kelly: I know, but you put deionized water in there and you put in the...

Tara: But then wouldn't we have water in that...?

Mary: But that messed up the last people who did it. Don't you guys remember?

Kelly: Yeah, Kim did it. Kim's group said it was fine.

Mary: Kim, is that fine to add some deionized water?

Kelly: It shouldn't matter with the reaction.

Kim: Yeah, it just...it just takes.

Kelly: It shouldn't. There's no way it can matter.

Kim: 'Cause it’s gonna filter out and it won't hurt. Any of it's just gonna go...

Mary: Okay, then go ahead.

Angie: I don't understand how that's gonna.

Rita: We’re not measuring this stuff left.

Angie: I thought that was the whole point 'cause we were measuring the substance in the filter paper, not the stuff that gets filtered out.

Rita: Yeah. We're measuring this <points to filter paper>. The deoinized water won't like...

Kelly: It's not gonna matter.

Rita: All the...it will just add more to this <points to the filtrate> which doesn't matter.

Angie: So wait, we're not going to put that stuff in <pointing to remainder of solution with precipitate>?

Kelly: No, we are. We're adding water into here <solution with precipitate> and pouring it into to here <filter>. You know what I mean?

Angie: And that won't do anything to the weight. Do you want me to go get some deionized water?

Kelly: Yeah, that's fine.

Mary: How are you guys doing?

Kelly: And then do you need this?

Dan: We have rubber police for you.

Tara: What is that?

Kim: To help take off solid.

Craig: To scrape out some of the precipitate.

Kelly: No, we're just gonna use water, but there's stuff left on the rubber thing.

Craig: Just scrape it off.

Debbie: Just scrape it.

Kelly: Huh?

Kima: So how are you guys? What group are you?

Kelly: Two.

Kima: What is that right there? <points to filter assembly> What is that right here?

Kelly: That there? CaCl2 plus Na2CO3.

Kima: Is that what I'm looking at right now?

Angie: No, isn't it potassium iodide and sodium carbonate monohydrate. Isn't that what this mixture was?

Rita: Yeah, that's what the white stuff was.

Kelly: Well, that was a mixture of Na2CO3 plus...

Kima: So that's what that white stuff is there?

Debbie: Now, it's…

Lynn: No, it's...

Kelly: Oh, the white stuff now is...

Rita: Now it's...yeah, now it's CaCO3.

Debbie: And there's sodium chloride.

Kelly: So what if we use this to scrap it off?

Angie: That's what we have to do. 'Cause remember how the last group when they added water?

Kelly: I don't remember that.

Angie: <points to another group> Okay, when their group over there added water and it took like it was gonna take way too long for it to filter all out. Think about it, the amount of water we're gonna have to add to this to pour into here...

Kelly: You don't need a lot of water. Do you?

Angie: ...but you still need some.

Jack: Little over five minutes, guys.

[07:01]

Kelly: Guys, if anything, I have SRT. I'll stay afterwards. Don't worry about it.

Angie: But I don't know if we're allowed to, you know? Whatever, I mean we have to...we have to let it filter.

Rita: Yeah.

Angie: Like so.

Rita: We don't have a choice.

Angie: Kelly, what am I holding? Is this the...?

Kelly: That goes into the fume hood. Jack and Kim are finding a container that we can pour that into.

Angie: Alright. What is it?

Rita: That's the 2NaCl and the KI. It's the waste.

Angie: So the NaCl and KI. Got it.

[07:40]

Frank: I like your tie-dyed coat.

Kim: Yeah, I know, it’s very colorful.

Kima: An employee made it for me.

Kim: Really, you didn’t do it yourself?

Kima: No.

Frank: No, she just messed up one day in the lab and boom.

Tara: Can I go to the bathroom?

Kima: That will be up to your managers.

Jack: Hey, you guys, when you put your stuff in the oven, don't unfold it, okay? Leave it as it is, put it on a petri dish, and put it in.

Mary: Well we weighed it when it was unfolded.

Angie: Are people almost ready?

Jack: Don't unfold it, fold it.

Tara: <to Kim> Um, can I go to the bathroom?

Kim: Yeah.

Kelly: Wouldn't it dry faster in the oven if it was unfolded though?

Jack: I don't think it matters.

[08:28]

Joe: You guys, how long are we baking this stuff for 'cause we're getting down to like the wire.

Kim: Exactly. So what Jack and I are gonna do…

Debbie: How are we gonna get credit for more time?

Kima: You guys need to talk as a group.

Kim: Well, it's gonna be during lunch and you know we're going to ask her as one of our questions. 'Cause we have at least the one.

Sandy: Wait, wasn't one of our questions...don't we have just the two left?

Kim: One or two.

Frank: No, we have three left. How many? Who's asked?

Sandy: I asked a question.

Joe: I've asked a question.

Frank: I asked one.

Kim: There's three.

Craig: Was that rubber police thing one?

Sandy: Oh.

Kim: I don't know if that was.

Sandy: No, that wasn't.

Joe: If we ask her a question about that, that's our last one. Or our second to last one.

Frank: We'll know when she doesn't answer.

Joe: Let's just safely assume we've got one left.

Kim: Yes, that's right.

Michelle: Okay, you guys, watch out, watch out.

Joe: Over to that oven.

Kim: If we can come in, okay, we have to get volunteers from...

Craig: I have 6/7 SRT like right now.

Kim: That's awesome. So do you think that you can come back later? But that means that you're gonna have to measure it.

Joe: So you gotta measure everything.

Sandy: Okay, I'm just gonna write the thing on the board and have people copy it.

[09:46]

Frank: I'll say a statement.

Jack: No. No. We have...

Frank: I'll say a statement. It'll be a statement.

<approaches Kima>

Jack: Wait! Wait! We can't waste the one question, if we need to use it...

Frank: You didn't give us our paper towels.

Kima: There are paper towels right there.

<classmates watch interaction in shock>

Jack: Okay, say okay, and move that way.

Sandy: Did you seriously use a question to ask her for paper towels?

Frank: Thank you very much.

Kima: You're welcome.

Tom: For accepting my statement.

Jack: Alright, we have to ask Ms. Gallagher right now.

Kim: Okay.

[10:27]

Jack: Oven. Oven. Oven. Oven!

Craig: Are we supposed to…are we asking about staying after?

Kim: We're about to do it in just a second.

Kelly: Are you asking if we can come in or we asking...?

Kim: Who's group? What group number is this?

Jack: This is...we already...didn't we already put the label on?

Kim: No.

Mark: Do you have our label?

Michelle: Yeah.

Debbie: Did we put our label on?

[10:54]

Kim: Alright, guys, two people from each group clean up the lab table. The rest of you please go sit down so that we can reconvene, okay?

Angie: Debbie and Kelly, can you guys sit down? We'll clean up.

Kim: One or two people, guys.

Angie: Kelly, me and Rita are cleaning so can you go sit?

Kelly: Oh, no wait, I would rather I just hang out.

Angie: Well, I'm just helping.

Kelly: I will sit.

Jack: Everyone else, come and sit down. You guys, one or two people, we need people to actually sit down 'cause we need to reconvene.

[11:52]

Sandy: Is one member from each group here? Okay, I'm sorry if I have a line on my face.

Frank: Somebody forgot to label their petri dish.

Sandy: If you guys...

Jack: Talk a little louder.

Sandy: Okay. One of the goals or the task for this lab is to find out the percentage by mass of each component of a mixture containing sodium carbonate monohydrate and potassium iodide. So that means you want to find out what percent of each of these two things...

Kim: Three.

Sandy: No, not this <points to $CaCl_2$ in balanced equation>, just these two <points to Na_2CO_3 and KI>. Um, so what you have to do is you find whatever the mass of your precipitate is. It's NaCl, sodium chloride, table salt, got it?

Debbie: Wait.

Dan: You sure those...

Joe: Alright, hold the phone, Debbie's got a problem.

Debbie: I thought it was calcium carbonate that was the solid.

Sandy: No.

Joe: CaCO3 was the precipitate.

Student: Calcium carbonate.

Kim: Yeah.

Lynn: Yeah, it's not NaCl.

Sandy: Isn't it NaCl, 'cause that's a salt?

Joe: No, NaCl dissolves in water, remember?

Kim: Does that mean we messed...?

Joe: Water and salt.

Sandy: Okay, well then, we'll just do it the opposite way. It doesn't...

Lynn: It's $CaCO_3$.

Sandy: It doesn't...it's doesn't change the...

Joe: Yeah, it doesn't change the amount. It's just the...

Frank: Can I ask you something? One of the groups left their label for the petri dish on the table so I went in to put it back. And then I noticed that one of the labels from another group had fell down into the like venting.

Kima: In the oven?

Frank: Yeah.

<Kima gets up and walks with Frank to the prep room where the oven is.>

Frank: I know which dish it is, but…

Kelly: Wait, guys, does this problem...aren't we doing the reactants? I mean...I just thinking what percent of reactant we need?

Joe: Yeah, I don't know.

Kelly: Why are we doing $CaCO_3$? That's a product.

Debbie: It's stoichiometry.

Joe: Are we gonna do it for reactants or products?

Lynn: No, you use $CaCO_3$ to get your reactants.

Kim: Guys, one at a time, please, okay? Alright, yeah, raise your hand.

Lynn: Okay, Ms. Gallagher came over to our group and asked us the same question.

Kim: Ms. Kima.

Lynn: And none of us knew what we were doing.

Joe: Who came over? Kima?

Lynn: So basically she just told us that by using the precipitate you could calculate your reactant. Like that's exactly what we've been doing for like the last month.

Kim: Yeah. Okay.

Lynn: So that's why we need the mass of the $CaCO_3$.

Jack: Alright?

Sandy: Okay. So sorry. I was wrong.

Kim: There's only one group who didn't label.

Sandy: Anyways, continuing on...

Dan: Wait, but aren't all our numbers shot now?

Sandy: No, I just changed it.

Mark: She just changed it.

Dan: But what about...?

Mary: She's got it.

Sandy: While you were talking to someone, I was like <erasing motion> and changed it. Okay.

Kim: He's asking if it would affect it now that we made it calcium carbonate.

Dan: I'm aware you changed the numbers, but...

Sandy: Let me explain it then maybe I will answer your question.

<laughter>

Jack: Sandy, you have about one minute go through this.

Sandy: Well, you first you find the grams, then you put it into moles, and then you use the balanced equation, and find the moles of Na2CO3 because remember that's what we did in that one. So then you find the mass of that, and that's the mass of Na2CO3. Then you divide that mass by the mass of your...

Joe: Wait, going to fast!

Kim: Oh, yeah, sorry.

Kelly: Sandy, we honestly have no idea what you're talking about when you're going so fast.

Sandy: Okay, someone told me that I only had one minute so I was hurrying.

Jack: Yeah, so, whoever said that. Shut them up.

Sandy: The mass of CaCO3, your precipitate, you change it into grams...I mean you change it into moles from grams, then using your balanced equation, you put it into moles of Na2CO3. Are you with me so far?

Students: Yes.

Sandy: Then you put that into grams. So you got the grams of Na2CO3, that's the amount of grams of that...of one of the two things in the mixture.

Angie: Was left over?

Joe: So that's the reactant, right?

Lynn: That's one of them.

Mark: One of them.

Sandy: Right.

Joe: All I need to know.

Kim: Yes.

Sandy: So then, you have the mass of one of them. You want to find out what percent is in the actual mixture. So all you do is take this and you divide by the mass of the initial mixture. That's that. Then you get the percent of Na2CO3.

Joe: Is the initial mixture the dry mixture?

Students: Yes.

Joe: Okay. That's actually a really easy way to solve it.

Craig: Why didn't you think of it?

Sandy: That's supposed to be an arrow. Then all you have to do to find the percent of potassium iodide is subtract from a hundred. So yet!

<applause>

Frank: Yay, sweet.

Joe: And that was beautiful.

Sandy: Write down. Write down.

Kelly: Thank you, Sandy.

Jack: Okay, you got that? Now we just to get to the point. Again, one more time, the people who are doing the presentation...

[17:12]

Kim: Okay, so...

Mark: I don't know if I have...

Nick: I may have.

Craig: Shut up!

Kim: Guys, okay, we're almost done, I promise. Okay, so for the commercial committee, I want at least two people from the five people that are coming...at least two people to come to the presentation...to my house.

Student: What time?

Kim: At around 2 o'clockish, you guys can come like in between 2 and 2:30 would be great, alright?

Irene: Shouldn't we all come?

<overlapping conversation>

Jack: I mean the thing is that we just want to keep this...you know, we don't need everyone there 'cause then it just gets a little too hectic.

Michelle: Are you going?

Kelly: Yeah.

Michelle: Angie, are you going?

Angie: Yeah.

Michelle: Are you going?

Sandy: Yeah.

Kim: Yes, we're gonna need...I mean like my house has a computer lab kind of so it's going to be pretty...a good place so that we can convene and put together our project. Alright, Debbie.

Debbie: Can we go over like everything else needed for our presentation?

Kim: Huh?

Debbie: Quickly.

Kim: Yes. That's a really good point. I'm just making sure that people know what they have to do come Sunday.

Craig: And where they have to be.

Kim: Exactly.

Sandy: And make sure that you have your part of the lab report.

Kim: Yes, oh, okay. Guys, that's a requirement...I mean I know 12 o'clock Sunday is kind of tough, but that gives you all of Saturday to do it.

Jack: And Saturday night as well. Friday night too.

Frank: It should keep you out of trouble.

Kim: Guys.

Mary: We doing both lab report and presentation this Sunday?

Jack: Putting the lab report together.

Kim: Alright, Robert.

Robert: Can you like send emails to everyone just like...?

Kim: To remind people?

Robert: Yeah. 'Cause like last time a lot of people forgot.

Kim: Sure, I'll do that.

Frank: I'll send emails.

Kim: Alright, also, guys, when you are done with your lab report it's gonna have to be at least by 12 so that I can put it together by the time that you guys come to my house. That means that, uh, the editor...okay, you're gonna have editors in your group...hopefully you've decided by now who's going to be like the writers and who's going to be editing it so that you can send it to me, right. My email is gonna be...

[19:01]

Kim: Also, what's gonna be happening later today during Lunch 1 is that Craig and Kelly are gonna be coming into measure out the filter papers for us, okay? So what you guys are gonna have to do is you're gonna have to record everybody's down and in some way communicate with at least two group members of the six groups and tell them what the measurement actually was. Try to do that tonight, alright?

[19:32]

Joe: Girls can wear ties.

Jack: Girls can wear ties.

Angie: Girls should wear like black pants.

Kim: Okay.

Frank: We should all dress the exact same way. Be an army.

Kim: Okay, also, guys, we're gonna take like a leaf like out of the book of other peoples' classrooms how they made, uh, like a, kind of amphitheatre-type look, where they put all the desks around in a circle and Ms. Gal..., uh, Mrs. Kima will sit.

Jack: We're good? We're all good? I'm just shredding the evidence. <erasing the board>

Kim: So we're just going to make it look a little bit more professional. Also, commercial, the commercial group, like offer like ice water.

Angie: Yeah, we got that. We got that already.

Kelly: Not her email.

Mary: Whatever, it's fine. We already got it.

Joe: What are you doing?

Craig: It's not that hard to remember.

Mary: Keep erasing. Forty seconds, guys.

Kelly: Hurry. Hurry. Hurry.

Angie: She’s going to the lights!

<Kima walks to the front of the room.>

Kelly: Even the next board! The next board!

Mary: Aaaah. Not the lights!

<Kima moves closer to the light switch.>

Kelly: Go. Go. Go. Go. Go. Go.

<Kelly joins Jack in erasing frantically.>

Mary: Watch out for the lights!

Frank: Hey, I'm still wearing my goggles.

Angie: You, guys, my group...

<Bell rings. Kima shuts off the lights.>

Student: Oh, it’s the lights!

SOLN-3A

[00:00]

<Students are arranging the desks into a U formation.>

Jack: Can we put one seat in the middle?

[00:16]

Jack: Real quick guys, we figured since Kim's family was really generous and so kind twice now to have all us for like one day, we just got a thank you card right here, so just pass it around, and we can get your signatures, and we'll give it back to her parents. Is that okay?

Students: Yeah.

Jack: Okay, then I'll start it over here. It's simple, just some flowers, there's nothing chemistry...

[00:48]

<bell rings>

Dan: We need a greeter.

Debbie: Who's going to greet her?

Kim: We've got Jack, guys, and I'll be right there and I'm gonna show her the commercial on the laptop.

Frank: Greet her.

Jack: Yeah, but I don't know what door she's coming through.

Tom: Cover all the doors.

Kelly: Okay, just sit down.

Mary: Guys, this is so cool.

Joe: Solution Solvers Corporation.

[01:28]

Kim: Oh, okay, actually guys, from what I've heard from the other classes, they're gonna ask the class the end questions. The thing is we already did the end questions thanks to Maria, Robert and Jack. And we have them at the end of the slide, so once she asks us that, we're just going to pop it in there and just explain it. We like went over it in depth yesterday…took us a long time.

Students: Yaaaay!

Kim: It was like extra four hours right there.

Maria: Kim, do we have to _____?

Kim: We may need you guys...we actually understand it pretty well. Like it took us awhile to get it, but we got it.

Michelle: Wait, I get it. If she asks me, I'm ready.

Mary: I don't get it.

Kim: We'll explain it today.

Lynn: Well, maybe I'll get it from this <referring to the presentation>.

[02:27]

Kim: Ok, guys can I just say something really fast? Guys, okay, we actually didn't even need to include half the information that we put on our presentation. I was reading it over…

Kelly: Why?

Kim: Because what she asked for us was just the purpose, the data, the data analysis, the procedure, and conclusion, that's all that she asked.

Dan: It still fits 10 minutes.

Debbie: Well, then we won't get the contract.

Kim: It still…wait a second…alright, she's still...it still takes...we still can do it in nine minutes, it shows our work, it's showing how much we actually did and how much we accomplished.

Michelle: So, it's better.

Kim: Yes, it's better. We are going to gloss over it. It's just gonna make us look more professional, 'cause we're showing what we did.

Kelly: Are we turning off the lights or no?

Dan: When she watches the movie, we can off the lights.

[03:13]

Michelle: Guys, she's here.

Joe: What if we're wrong? What if our presentation is over in five minutes?

Michelle: You guys, she's here.

Kim: Who do you think _____ you?

Craig: It has to be 10 minutes.

Students: Ssssh.

Dr. M.: <walks in holding a folder> Hi.

Students: Hello.

Dr. M.: Where would you like me to sit?

Kim: <motions to desk in the middle> Right here please. We have also prepared a commercial for you to view some of the work we do actual in lab with a visual image. <turns on laptop movie>

Dr. M.: Okay.

[03:50]

Dr. M.: Okay.

Kim: Alright, now we would like to present you...we at Solution Solvers Corporation…we'll give you a hand-presented data analysis so that you can view our work on the actual level. So when we get to the data part of our presentation, you can refer to that.

Dr. M.: Okay.

Frank: Alright, we're Solutions Solvers Corporation, also known as the 4-5 B Chemistry Class.

Joe: Our company's purpose is to calculate the percentage by mass of sodium carbonate monohydrate and potassium iodide in the final product, calcium chlorate.

Frank: Background, well, we used stoichiometry as a very experienced solutions company. We also used our background knowledge from the many problems and balancing equations that we've done. We made sure that we had our mastery of solutions and solubility down. Our company has mastered molarity, just to make sure that all these chemical equations were simple and easy to do.

Joe: For our procedure, first we had to calculate how much $CaCl_2$ we needed to add to a 250 mL volumetric flask in order to make a 0.5 M solution. We calculated this to be 13.89 g. We then added the solution into a 500 mL beaker and added the sample of KI and Na_2CO_3 into the same beaker. We then placed the beaker with the KI and Na_2CO_3 and our solution into a magnetic stirrer. We put the magnet inside, and the stirrer on, and turned it off once no pieces of $CaCl_2$ remained. We then massed a dry sheet of filter paper, which we would subtract from our mass of our precipitate. We then folded the filter paper in half twice, put it in a funnel, then put the

funnel in the graduated cylinder and poured our white solution from step four into the filter paper.

Frank: After we did all that, we let our solution drain, so only $CaCO_3$ would remain in the filter paper. The NaCl and KI aren't visible in the solution that's in the granulated cylinder underneath the funnel because they dissociate in water. Once we had all that done, we took the filter paper out of the funnel containing the $CaCO_3$, and we put it in a petri dish, which we then placed in the oven for 20 minutes at 250 degrees Fahrenheit. Then we disposed of all the waste, which is the NaCl and KI, into a beaker under the fume hood, which was labeled. After 20 minutes we took the dry filter paper containing $CaCO_3$ and we massed it.

Joe: For our data we have one master graph that goes over two slides, this is the first slide. As you can see we have all of our lab groups on the first column, and our averages are on the bottom row. The first column is the mass of our initial mixture. We had six so we have different masses for each six groups. All the masses were slightly different. So in order to account for that we had to have slightly different volumes of calcium chloride solution in order to make the same percentages. We also massed our filter paper, which we would subtract from our mass of the calcium carbonate.

Frank: As you can see after we had conducted the experiment, we used stoichiometry to find out the mass of sodium carbonate. Once we had the varying masses per group, you can see that we used this to find the percentage from the actual mixture by dividing this by the initial mixture. Once we had this percent per group and we had the average, we subtracted this from a hundred to get the percentage of potassium iodide. Once we did all that we just averaged 'em out simply so you could see that we ended up with roughly 60% sodium carbonate and roughly 40% potassium iodide in our solution.

Joe: Um, these are our calculations that we used to find our milliliters of CaC_{l2} from Na_2CO_3.

Frank: Our company used these calculations to find the mass of the $CaCO_3$ and the sodium carbonate. We also used these to find the percentage of the KI and sodium carbonate in the mixture.

Joe: For our data analysis, this is a bar graph showing grams to group number. Each group had slightly different masses of potassium iodide and sodium carbonate in their mixtures, and this graph shows the differences. As you can see the ratio of our mass of potassium iodide and our mass of sodium carbonate are almost the same, except for group six, which I think had a leak problem with their filter.

Frank: This pie graph right here shows the average percent of substances from the original mixture. After we had done the whole lab, we found our averages and just used that to find the percentages for each substance, which was roughly 60% for sodium carbonate, and roughly 40% for potassium iodide.

Joe: For our error analysis, as you can see, most of it has to do with the filter paper. Either small quantities of solution could go through the filter paper or it could have not filtered out all of the solution.

Frank: Our company came up with this conclusion, which was, after we had done all the math we found that roughly 60% of the solution was sodium carbonate monohydrate and roughly 40%

for potassium iodide, respectively. The masses were calculated using stoichiometry after we had found the mass of $CaCO_3$, calcium carbonate. To find the percentage, we used sodium carbonate and we divided that by the initial mass.

Joe: For the second part of our conclusion in order to find the mass of potassium iodide we subtracted the resulting percentage of the sodium carbonate from 100%. All six samples were calculated in this way, and as a community we felt that it was the best way to find the individual percentages of each component of the mixtures.

Frank: Our company is very devoted and the most efficient and most effective at achieving your goals, and we think we're the best company for doing your solution analysis.

Joe: These are a couple pictures of our work.

Frank: Any questions?

Dr. M.: Um, yeah, I've got a few. Could you turn on the light though? At least, maybe the back light?

Frank: Oh. My bad. <turns on all lights, but gets right one on>

Dr. M.: There you go. I think it's a little better. Okay, first of all, back up to the procedure where you guys were talking about that and let me see the first couple of slides there.

[10:31]

Dr. M.: Okay, once you made the 0.5 molar solution of your calcium chloride, how, okay, it says...

Joe: We filled in the blanks. We put it into...

Dr. M.: Pour the white solution from step four...

Joe: ...into the filter paper, which was on a graduated cylinder...

Dr. M.: Ok, so how much of the point, that's what I don't see, how much of the .5 molar calcium chloride was placed into your beaker for each group.

Frank: That's on the chart...

Dr. M.: Can I see that?

Joe: Yeah.

Frank: For each group, we got this using stoichiometry on the next equation, on the next slide.

Dr. M.: Okay.

Frank: On the next slide after this.

Dr. M.: So each group used a different volume...

Frank and Joe: Yeah.

Dr. M.: ...of the calcium chloride based on this...

Frank: We made this stoichiometry equation.

Joe: The masses ended up being slightly different for each group so we had to adjust for that.

Dr. M.: So that first blank you have in that calculation was what?

Joe: That was the mass of our initial mixture.

Dr. M.: Okay.

<Dr. M looks through the provided paperwork. The class sits silently in a half circle around her. Presenters patiently await her response.>

Dr. M.: Okay, so they put the calcium chloride solution in the beaker and then added the solid and stirred, that was what the procedure said, and then you filtered. Okay.

[12:07]

Dr. M.: Okay and two other chemicals that could be used instead of the calcium chloride?

Frank: Silver nitrate and calcium hydroxide.

Dr. M.: Okay, can you explain those?

Joe: Uh, yeah sure. As you can see down here in these chemical equations, uh they could take the place of the other chemicals in our reaction and they dissociate in water just like the others did except for silver nitrate and calcium hydroxide are precipitates in these equations.

Dr. M.: Wait, say those again, silver...

Joe: Silver nitrate and calcium hydroxide are the precipitates in these two equations.

Dr. M.: <takes notes> Okay, those are the precipitates?

Joe: Ohhh, I'm sorry, no, they're the reactants. Precipitates are silver, uh…

Student: Silver carbonate.

Joe: Silver carbonate and calcium, uh, calcium carbonate.

Dr. M.: Okay. And I had a question about the particle stuff. Is that what this is? <raises a paper>

Joe: Yeah.

Dr. M.: Can someone explain this to me?

<Kim grabs paper from Dr. M. and gives to Frank>

Frank: Well the particulate drawing...Should I come out there so you can see?

Dr. M.: No, I can, that's fine. Just talk me through.

Frank: Alright. In the particulate drawing we drew a “before,” “during the mixing,” and then “after the filtering.”

Dr. M.: You know what? Why don't you turn on the light though so everybody can see it better.

<Frank turns on all lights.>

Dr. M.: Thanks.

Frank: Before the mixing, you can see that the calcium...you can see that the uh…calcium carbonate is separate. And then before we did all that, this is the initial mixture of sodium carbonate monohydrate and potassium iodide right here <points to top left diagram>. And we did the reaction by mixing calcium carbonate with our initial mixture by placing it on the magnetic stirrer. Once we had done that, we did it by putting it in the filtering apparatus, and it filtered out calcium carbonate leaving behind NaCl and KI.

Dr. M.: Okay, so from beginning to end, are you keeping track of every particle and is there anything in excess? <pause> You guys don't need to be the only ones talking, anybody can answer for you.

Joe: Sure, who wants to take it away?

Sandy: Can you repeat the question, please?

Joe: I don't really understand what you mean by that question…

Dr. M.: From beginning to end, is every particle reacting, or do you have anything left over?

Joe: Uh, yeah, we do have leftovers. You can see the precipitate is at the top, the KI doesn't really react with anything, it just dissociates in water.

Dr. M.: Okay.

Joe: ...which is a physical change. And also…our two other substances instead of...the only thing that reacts in this equation is the precipitate. Everything else dissociates in water.

Dr. M.: Okay. So link this with the calculations you did. You said you calculated based on the starting mass of your mixture, how many milliliters of the calcium chloride to use, right? So, did every particle in that volume of your calcium chloride react? Did you add the perfect amount?

Sandy: No.

Dr. M.: Why not?

Sandy: Not all of it reacted because in the mixture there was only 60% of the, um...there was...we only needed 60%...there's 60% in the mixture, so you only needed 60% of the volume of the calcium chloride to react.

Dr. M.: Okay.

Sandy: So there was probably about 40% of the solution left over that did not react because there's only 60% of the sodium carbonate and we, well I guess you could say that some of our solution was wasted, I guess, but before we did the equation you can't assume how much of the sodium carbonate is in the mixture so you had to…'cause there could be 100% or there could be 0% or anything in between, so you had to figure out the volume of the solution needed for the mass of the entire mixture.

Dr. M.: Okay, so in that picture, is what you said represented?

Sandy: Yes.

Dr. M.: Can I see it?

<Frank hands her the particulate drawing>

Dr. M.: Okay, there are lots of colors to follow, hold on. Okay, who drew this?

Kim: Mary, one of our consultants.

Dr. M.: Come here for a second.

<Mary walks over to Dr. M.>

Dr. M.: This guy is calcium chloride, right?

Mary: Yeah, but _____.

Dr. M.: Oh, okay, so you used the same colors.

Mary: Not just each…

Dr. M.: Okay, I got it. Thank you. Got it, okay. Alright, anything else you need to share with me?

Frank: I don't know, is there any other information you'd like to know?

Dr. M.: No, I think I've asked all my questions.

Kim: We'd just like you to consider choosing Solution Solvers Corporation as your company.

Dr. M.: Okay.

Frank: And we'd like to thank you for your time.

Dr. M.: Great.

Jack: And we do have refreshments right behind you.

Kim: And if you're partial to any bagels?

Dr. M.: Refreshments? Oh, they're behind me. You know, I'm gonna pass on the refreshments and let you guys enjoy those.

Kim: Thank you.

Dr. M.: And I'll be in touch. Alright, thank you.

Dan: See you.

<Dr. M. exits room. Students clap and high five. Most head to the refreshment table and discuss how they think the presentation went.>

Mary: I told you that she was going to ask about that drawing.

Kelly: I know. I knew it. I knew it she'd ask us.

<Half of the class is round the desk with bagels.>

Dan: She started asking questions at like 8:45.

Kelly: Thank you, Irene, for going out and buying these.

Kim: Guys, just to remind you, don't relax too much, we've got a class assessment right after this.

Kelly: We do?

Mark: Are you serious?

Kelly: You think?

[19:45]

Joe: She grilled us.

Jack and Kim: Yeah!

Mary: We pretty much had…the drawings are wrong and it's my fault. I never even thought about that there was extra stuff. The drawings were wrong.

Kim: Really?

Mary: It was like one thing.

Kim: Yeah.

Frank: My fly's been undone the whole time.

Mary: Sandy, I saw your face. You were like… Oh god, why'd I just speak up?

Angie: She like turned it around and she like whipped it on you.

Kim: You told me it was wrong, and I was like I know it's wrong, but where? And then you raised your hand and I was like: awesome.