Lesson:	Introduction to Mixtures and Solutions
Teacher:	Adelyn Lyon
Video URL:	http://education.ucsc.edu/ellisa/case_studies/separating_mixtures_intro.html
Clip:	Part 2

Abbreviations:
T = Teacher S = Student Ss = Students

[00:00:00]
T: So we can now get started on getting in there and getting to learn about our materials. So, I'd like everyone to look at the packet in front of you. Okay? The first page, we've already done some of it so that we could move quickly. So go ahead and read step one and step two. Read what we've already done.
Ss: *[students reading instructions out loud]* Label—[???]
T: Okay. I'll know you're ready if you're sitting like Mildred. And David. Okay. So this is really similar to scooping like you've done before. But what does that level mean? That's a really important part of living systems, but leveling is also really important especially in chemistry. What does is it mean to level? If I wanted to level something…Mia?
S: To help you get an exact amount.
T: Yeah! It's to help you get the same amount. So I want you all to take your hand like this. Pretend like this hand is the scoop. Take your finger. And we're going to level it. So we're going to go like this. And go like this. And say "I'm leveling!"
Ss: I'm leveling!
T: So make it level means to make it smooth so it's the same all the way across. And who remembers why it's important that we do that? Why was it important when we did the yeast experiment that we *leveled* the materials? Krista?
[00:1:24]
S: [???]
T: Yeah. Because if one had more than another, we just did a big scoop, we wouldn't have a scientific experiment because we wouldn't know how much some had against what the other one had. So, what we're going to be doing now is that I'd you all in your science notebooks to turn to the worksheet that you have in front of you. Alina, can you hold yours up so everyone can see what we're suppose to do right now. It should say "Properties of Matter" at the top. Go ahead and point to it where it says "The Properties of Matter". And check that your partner's in the right spot.
Ss: *[students shuffling through workbooks]*
T: So what we're going to be is we're going to do that first objective we had. We're going to be making *observations*. And what we're going to use to make an observation is we're going to use this hand lens. Go ahead. Tell your partner, tell your group, what did we use a hand lens for?
Ss: *[students talking all at once]* Like a magnifying glass.
[00:02:24]

T: Okay. Three, two,... So that should be a good idea, especially how Max was talking about how it helps us see really tiny things. What Karina said too. So you're going to be using that and you're going to be using this recording sheet. So, what I would like—and the rules for this, let me tell you the rules. So when you were observing it, you want to know the texture. What do you have to do in order to know the texture of something—really, really know the texture for it?
S: You feel it?
T: You have to feel it. So! You're going to get to pass this around. You're going to feel the material, you're going to look at them, I don't want you to put your face over them. Especially the diatomaceaous earth because of the material—it licks the poop up. And if it gets into your lungs, it can actually hurt that. Okay? Remember, as chemists, we're going to start using some materials that only almost-middle-schoolers get to use. So we have to be really careful with that. But you can touch the materials. You can look at them. You can look at them with the hand lens. Talk with your groups. And then you're going to be jotting down on here, not complete sentences, just jots, what color it is, what texture it is, just draw a picture of the shape and the rest of the boxes, using adjectives to fill it in. Yes Dylan?
[00:03:43]
S: We get to look at any one?
T: Yeah so you're going to start anywhere you want and so in that way, you can all sort of take turns, right? So that maybe one person is going to start looking at the gravel, one person will start with the diatomaceaous earth and one person will start sodium chloride. But it's really, really important that you put it in the right box. If I'm doing the gravel box, am I going to put diatomaceaous earth here?
Ss: No
T: No! That would be a problem. Then my records wouldn't be accurate. As a scientist I need accurate records. So I'm going to give you about five or ten minutes for this activity. And who can tell me a good idea, when you're done, if you feel like you're done, what would be some good things that you might want to do. Um, Mildred, what might you want to do?
S: vocabulary words
T: Okay, you might want to look at your vocabulary words. What else might you want to do, Alexis?
S: Read your results or share them with your partner.
[00:04:35]
T: You might want to share your results with your group. See if you got the same adjectives or different adjectives. So, uh, yes?
S: Or we can just catch up on our reading.
T: You could catch up on your reading. I think I want you to focus on science right now even though that's an awesome idea and I love that you're being motivated to read. But let's focus on the science and keep with vocabulary or especially sharing those results. Thumbs up if you understand what you're supposed to do right now. Okay. Please go ahead and read the step…
Ss: Do the step!

T: So read step three and then you may pick up your cup and get started.
[00:05:04]
Ss: *[reading instructions outloud][students start their work]*
T: So Jaden, what substance do you want to start with first?
S: [???]
T: The sodium chloride? Okay, good! Okay so what would you do? What would be a great solution for that?
S: [???]
T: [???] Well there is a paper towel on your tray so you can just use that. So Jonathan, now what did you notice? What substance are you looking at right now?
S: Gravel.
T: Gravel. Okay, what adjectives have you figured out so far about gravel? What properties have you noticed?
S: It's hard.
[00:06:08]
T: Okay! So what, which category did you put that under?
S: [???]
T: Okay so one of the properties of gravel is that it's hard. What else? What other properties have you noticed?
S: It has some [???]. It's white on some. [???]
T: Okay. So some of it is a little bit sharp. So where do you think that would go best? Probably under the shape excellent.
[00:06:30]
T: I realized that we…we've talked about these when we were talking about the magnesium, but with the—and um—so the shape which you are talking about, you can talk about, some are of a round shape. Some are square. I heard the word "crystal" from one of the items. And then with particle size, what you want to use our comparing words too. So you can say it's small. But I can compare it to the other materials. So if I was saying gravel. The gravel particles—are they larger or smaller than sodium chloride particles?
Ss: Larger!
[00:07:07]
T: So I could write here, "larger than", using that comparing word, "larger than sodium chloride". And in the other boxes, any properties that you have observed that don't really seem to fit into these? Anything else that you think is interesting or cool about that? Okay, keep going guys. Make sure we're all sharing nicely.
Ss: *[students resume observations]*
T: So which one have you done? Have you done one yet? So let's make sure we're sharing. So Dylan what did you notice about the sodium chloride?
S: It feels kind of kind of rough.
T: Okay, so what category would that go under?

S: [???]
Ss: *[students talking among themselves]*
T: Okay, thirty more seconds. If you're done, you know to work on that vocabulary—are you guys doing that? Awesome.
[00:08:09]
Ss: *[students talking among themselves]*
T: okay, the substances should be back on your tray and you should be practicing that vocabulary.
Ss: *[students talking among themselves]*
[00:08:31]
T: Okay, so I heard a lot of really good observations. Raise your hand if you compared one of these to sugar. Anyone compare the sodium chloride with sugar…in the appearance of it? I saw that on that other category for some of you. What were some other observations that you thought were pretty cool or interesting. Anyone want to share out? Uh, James?
S: I noticed that some of the gravel had different kinds of minerals in it.
T: Okay, raise your hand if you agree. You also noticed that the gravel had different kinds of minerals or materials in it. You can see they look different. They're pieces of gravel that look different. Raise your hand if you also observed that—that the pieces of gravel were different. Okay um, Jonathan M, what's something you observed about one of our materials being used?
S: Um, I think the gravel was hard?
T: Okay, so you observed that the gravel was hard. Excellent, raise your hand if you also observed that the gravel was hard. Or rough. Excellent.
[00:09:35]
T: So these properties, we're going to be using for our second part of our experiment. Now we are going to create mixtures! Tell your group what you're going to be doing!
Ss: Create mixtures!
T: So does anyone remember, from the very, very, very beginning what we said we'd be mixing our ingredients with? Anyone remember what we're mixing with after that?
S: Water
T: We're going to mix it with water. So, in just a few moments, we're going to be setting up our notebook. The first person who is done, and we're not going to rush, we're going to do a good job because scientists make sure our records are really great, but the first person who finishes setting up their notebook is going to come up here and get a container of water. Are you going to move around really crazy with it?
Ss: No
T: Are you going to put it on the crack between the two desks.
Ss: No
T: Okay, put it safely on the desk so that we can get ready to make some mixtures.
[00:10:30]
T: So the first person who is done with our next activity from each group will come to get one dish. Ready, set, read!

Ss: Draw three empty cups and label after part two of lab, draw your mixture in the correct cup. Label drawings with adjectives to describe your mixtures *[students reading instructions]*

T: So all we're worrying about right now is step one. And that's making your paper look like this. So you're going to draw three cups and you can tell it takes up the whole page. And you're going to label them with their titles. And this column is called predictions and this one is called results. The first person in your group who has finished this nicely, if it's rushed, it won't count, has to look really nice, will come over here and get one of the bowls and bring it back. Go ahead and work on that please.

[00:11:22]

T: Okay, before we get started, we need to make a prediction. We need to think about what do you think will happen. So what you'll be doing is you're going to take some water. You're going to take our favorite amount—50 milliliters of water, okay. You are going to be, adding it in to the material. What do you think is going to happen to this material? Like the properties—how it looks, the texture…do you think any of that is going to change? You are going to use one of these frames, and these are the same ones that are in the back of your science notebook and they're up here, and on your piece of paper, if you look at Laura's right here, excellent dear, excellent. On your piece of paper, you're going to write next to the cup, your prediction.

T: [continued] So I might write, "I think gravel, or the gravel mixture, will (blank)" or "I think the gravel will…" or "What I already know about gravel helps me predict that…". And I'm going to try to do a different one for each one. So this is a quiet activity right now. You're going to go ahead and write down your predictions and I will give you about two minutes. And then I will call on some volunteers. So go ahead and write your predictions for each one. So what do you think will happen to the gravel when you mix it with water? What do you think will happen to the diatomaceaous earth when you mix it with water? And what do you think will happen to the sodium chloride when you mix it with water?

[00:12:49]

T: [*talking to a student]* So I predict the diatomaceaous earth will…what do you think will happen to it? when you mix it with that water, what do you think what?

S: Swirl? I think it will swirl around in the water?

T: It will start like…swirl around?

S: Yes

T: Okay. Put that down. You can say "I predict the diatomaceaous earth will swirl around because…" Why do you think that will happen?

S: Because… [???]…in the water…[???]

T: Excellent. That's a really good point. Write that down.

[00:13:35]

T: So I heard some really good predictions coming from some people. I heard someone make a comparison to maybe a diatomaceaous earth, it might start making like a pancake sort of mixture because it sort of looks like flour. Lots of things sort of swirling around. Using those properties,

like, I think the sodium chloride will float because it's light. So making those predictions. Uh…please pick your favorite prediction and share it with your group. Go.

Ss: *[students talking among themselves]*

T: So we are ready to do the next part. In the next part you're going to do it with your group. You need to read the step…

Ss: Do the step!

T: Okay. Make sure you do step one, step two…so you're going to take the water from this bin that you have, with your syringe, to put it into the cup. Now I'm noticing on this directions it has this part right here where it says "stir for one minute".

Ss: "stir for one minute"

[00:14:34]

T: Who can raise their hand and tell me how you will know if you've stirred it for one minute. How could I know if I stirred something for one minute? Eva, how would I know if my group has stirred something for one minute? How could I figure that out?

S: Look at the clock?

T: You can look at the clock! So you find the red hand, when it gets to like 35, and then look until it gets back to that 35. So someone else has to be stirring and you have to have someone to time—timing it. Raise your hand if you have a watch in your group. Someone…anyone have watches?

Ss: *[students murmuring]* I forgot.

T: Okay. A few of you have that. If you wanted, you can use that. But it's really easy to just follow that red hand until it gets back to the same number. So I'm going to go ahead and when you do this, you are going to—look up here real quick and then I can let you go ahead and get started on that lab. You're going to be labeling your cup. So this is your cup. I'm going to draw some arrows and write some adjectives like "it's clear" or maybe "it's cloudy". Maybe it floats, it sinks, it's clunky—to describe that cup. So this goes on the cup on your worksheet. Thumbs up if you understand. Okay, you're going to read the step…

Ss: do the step!

[00:15:45]

T: What's everybody starting with?

Ss: Water.

T: Okay, go!

Ss: *[reading instructions out loud]*

T: Excellent, thank you.

Ss: *[students talking among themselves and working on the lab]*

[00:16:34]

T: *[talking to a group of students]* So what's in that one?

S: Salt, it disappeared

T: Salt? Why do you think that happened?

S1: It disappeared. It's salt water now

S2: It dissolved. It turned into salt water.
T: OK so there should be some label. OK so you should put those labels down, so draw your water, and you put that it looks like water, so put your labels.
[00:17:06]
T: *[Talking to a group of students]* So which one are you doing right now?
S: We already done with the [???] now we're doing the salt.
T: OK so what have you noticed so far, what's happened?
S: This one's harder, this one was white but now it's gone.
T: OK, so what else besides white?
Ss: [???] *[students continuing to discuss lab]*
[00:17:26]
T: There was a lot of excitement especially about the sodium chloride. What was so unique about sodium chloride that was sort of a—you guys seemed sort of—raise your hand if you were surprised by sodium chloride and what happened to it. Some of you. Anyone want to share what surprised them about that sodium chloride. Mia, what surprised you?
S: Uh…it surprised me that…when we didn't have it in water in the cup, it was a solid—but when we put the water and we mixed it for a minute, it got clear.
T: Anybody else saw that clear part? You think like salt is white, but then you add water and then—what was the word…some people used…I think it was maybe…Alexis, what word did you use?
S: The salt dissolved.
T: Dissolved! Raise your hand if your group also used that word, *dissolved*. So it disappeared. Give me an interesting reason why. Max, why don't you share with the class what your reasoning was and why you think it dissolved and wait until everyone gives you respect.
[00:18:35]
S: My reasoning for why it dissolved was that, um, the salt was all dry and since it dissolved, um…it dissolved because the water was all soggy and like…
T: It sort of reminds me…raise your had if you've had hot cocoa before?
Ss: What? Hot co…?
T: Hot cocoa? Like hot chocolate?
Ss: Oh!
T: Keep your hand if you've ever used like the powder, and you mix it up…
Ss: *[students speaking up in agreement]*
T: So…it sort of reminded me of that. You have like a powder and you're mixing it. But I know with the hot cocoa, did it stay clear?
Ss: No
T: No. It was more like a diatomaceaous earth where it sort of kept the color of that powder. Sodium chloride is clear so that makes it different. So that makes it sort of like a special type of mixture. And we're going to be looking at that.
[00:19:30]

T: What we're going to do now is just going to get started with this on, um, trying to separate these. So you have three cups full of mixtures and we want to take them apart. So in order to do that, we're going to use something called a filter. Everyone say "filter"!
Ss: Filter!
T: Make sure your hands are empty. We are not touching lab materials right now. Okay. So filters are something that we used to separate a mixture or remove things. And this is sort of an interesting word 'cause it has a noun form and a verb form. Mildred, how do we say the noun form of filter?
S: filtro
T: Everyone, one, two, three!
Ss: Filtro!
T: So the noun form is a thing. So I have here a filter I use all the time. Raise your hand if you have one of these filters at home. Tell your group what you use it for.
Ss: [???] Potato! | Macaroni and cheese!| salads *[all talking at once]*
T: Mata Loma!
S: Leopard leaders!
T: What do I use this filter for, um, Mariah?
S: [???]
[00:20:42]
T: I could use it for salad. So in that case, I'm trying to filter out, I'm trying to separate the salad from the water that's on the salad—that mixture. Um what else might I use this for? Antonio do you have one of these at home?
S: Yes
T: What do you use it for?
S: Macaroni and cheese
T: Okay and what are you trying to separate?
S: The water?
T: The water from the noodles. Raise your hand if you also use this for separating water and noodles? Anyone else use it to separate salad from water? A few of you…okay! So…what's really cool about filters is that they let us separate a lot of mixtures. And, um, sometimes people use like coffee filters…raise your hand if you've seen one of those at home before.
Ss: I've seen them. | Yeah…
[00:21:30]
T: Okay and that separates out the coffee grounds from the coffee—the liquid coffee. You wouldn't want to drink the solid coffee part. Okay, we have air filters. And air filters can separate out things that get stuck in the air. And then I have one of these at home. It's called a Brita filter. And what a Brita filter is, is that it separates out stuff you wouldn't want in water. Does anyone have a Brita filter at home? Okay. So…these are all different kinds of filters. They're nouns. But, a filter can also be a verb. Mildred, how do we say the verb form of filter?
S: Filtrar

T: How do we say the verb form of filtrar, Mildred?
S: Filtrar
T: Can you say it louder
S: Filtrar
Ss: Filt-rar
T: Okay, repeat after Mildred. Real loud, one, two, three?
Ss; Filtrar!
T: Okay…the rest of us…I have trouble with that one.
Ss: Filtrar
T: Mata Loma!
Ss: Leopard leaders!
[00:22:37]
T: Okay so a verb is the action. So this is a filter. I am using it to filter my pasta. So the action is…so I want to filter out the water from my pasta. So we're going to be using filters today. So eyes up here. I want you to turn to the next one. And read this question out loud with me on three. One, two, three…
T+Ss: What do you think will happen when you use the screen to filter the mixtures?
T: So…go ahead and look at the back. And I'll take care of you guys in just a second. So…we're going to make our predictions and it looks like we'll be doing this part on…later. But this is a screen. Which of your mixtures do you think you can separate the water from your material using this? I'm going to pass these out. Go ahead, and if you look at the board, go ahead and make a prediction which ones do you think you can filter out.
S: They use these on the door screen thing!
S: Oh yeah!
Ss: *[students discussing]*
[00:23:43]
T: So in this column, if you think gravel can be separated by the screen, the gravel mixture, go write yes here. If you think it can't, go write no, Same thing for these. You have about twenty more seconds to make your prediction.
S: It's going to stay there.
Ss: *[students discussing]*
T: Raise your hand if you think you *can* separate the gravel mixture? Okay. Pretty confident with that one. Okay, hands down. Raise your hands if you think you can separate the diatomaceaous earth mixture? A few people think maybe. Okay, hands down. And raise your hands if you think you can separate the sodium chloride mixture? Oh, not too many people. Just a couple. Okay, so what you're going to do. Please go ahead, flip in your packet, to the next page.
[00:24:37]
T: And then sit with a learning body. Okay. So what you're going to be doing is you are going to take—you're going to start with your gravel and you'll have your empty cup—where should your empty cup be? Tell your neighbor.

Ss: On the tray
T: And then look back to me when you're ready. Okay. So, Mildred, where should your cup be?
S: On the tray.
T: OK it should be on the tray on the paper towel. So you're going to have your empty "G" cup and then you need to put this on top. Now this is—you have to be very careful. If you try to pour this fast, it's just going to spill right off. All over. So what you do is—pour it slowly. And you can sort of use your fingers to rub it to help get the water to start going through. But it's going to be very slow. Once you poured this one, you'll put it down and then on your worksheet, you will write results. Yes or no, did it work? And if you've noticed anything special.
[00:25:46]
T: Then you're going to do the same thing with the diatomaceaous earth with the "D" empty cup and the same thing with the "S" cup. Now last time you had some trouble following directions. So it's really important that we're carefully following the steps as they are. Okay, we don't have much time left so I'm hoping we can finish the screening for all three, but we need to be done in about seven minutes so we can do a quick closing and finish up. OK? So I need your help to be really focused. So thumbs up if you can do that. Okay, please go ahead.
[0:26:26]
Ss: *[students discussing and working]*
[audio is cut to after their activities wrap up]
T: Most of you have finished. But not all of you. That's okay.You're going to get a moment to finish is just a second. But a lot of you are done so I want you to know what we're finishing with today. We're going to finish by reflecting on why do we think a mixture will separate. So I want everyone to read this with me with the blanks. Even if you're not done with your filtering with using your screen as a filter. We're going to read this up here. So ready, set, read.
T+Ss: The mixture of (blank) and (blank) was separated by (blank). I think that the screen was able to separate this mixture because (blank).
[00:27:23]
T: So on your worksheet, the first question is this question. And you're going to use this. What would go under—so in the first two blanks would be water and whatever water got mixed with. What would—what are we using to separate? Which kind of filter were we using in this part? Go ahead and tell your partner the name of the filter.
Ss: Screen
T: So what kind of filter were we using, Laura?
S: Screen
T: We're using a screen. And you're going to say why you think this screen could separate that mixture so please finish this up now and we're going to share out and that's going to be our closing. We need to be done in about two to three minutes. If you're not done filtering it with your screen, go ahead and finish that and then answer that. Go ahead. Go.