



SEED Viscosity Webinar

OPERATOR: Good day and welcome to today's SEED Viscosity Web conference. At this time, I'd like to turn the call over to Ms. Love Zubiller.

LOVE ZUBILLER: Good morning, good afternoon and good evening to everyone wherever you are. Thank you for your interest in the Viscosity SEEDKIT. My name is Love Zubiller and I am the Volunteer Coordinator for SEED. My colleague, Michael Tempel, and I will be leading this call today. Our goals for the next 20-30 minutes are to provide a brief introduction to SEEDKITS; show and tell you more about the Viscosity SEEDKIT and discuss how to hold a SEED workshop at your local school; demonstrate how volunteers like you can order the SEEDKIT; and then, at the end, have a Question and Answer session about SEED, SEEDKITS, viscosity and whatever else interests you.

SEEDKITS are based on three important elements within the SEED program and culture. First, the foundation for SEEDKITS is the SEED workshop and its success in engaging teachers and students with technology and science. Second, the science content in SEEDKITS is from the SEED Web site. Much of this content has been the result of our interaction and communication with teachers. And finally, the SEED volunteers themselves and their support and commitment to our program. SEEDKITS are truly a volunteer centered program. Volunteers suggested the idea. Volunteers helped develop them. Volunteers are using them in schools. And now we are asking for feedback from volunteers to make them even better. So the foundation for our SEEDKIT is the SEED workshop, SEED content and SEED volunteers.

Now you are probably asking "What is a SEEDKIT?" A SEEDKIT contains the materials and guidance needed for any volunteer to lead a science workshop at a local school or for a teacher to lead a science workshop with a class. Each SEEDKIT has instructions and training materials so that people like me, in other words non-scientists, can feel confident in the material and can deliver a science workshop at a school. Each SEEDKIT comes with materials in seven languages including: Arabic, Chinese, English, French, Portuguese, Russian and Spanish. I hope everyone here is a registered volunteer. If not, please visit our Web site and complete the registration form. It only takes a few minutes of your time. Even better, you can invite your friends to volunteer, to register, and to join us in a SEEDKIT workshop sometime. So I'd like to give the microphone to Michael Tempel, our Director of Educational Programs, to tell you more about viscosity.



MICHAEL TEMPEL: Thanks Love and hello to everyone. I'm going to tell you a little bit about the Viscosity SEEDKIT. What you should be looking at on your screen right now is the SEEDKIT page on the Web site and at the moment, there are five SEEDKITS, one of which is Viscosity, which we're going to look at today. So "What is viscosity, first of all?" It's the property of a fluid that determines how easily it flows. For example, if you pour water, it'll flow more quickly than honey or syrup. That's because those sugary liquids have a higher viscosity than water. Viscosity is also affected by temperature. If you keep honey or cooking oil in the refrigerator, and then try to pour it, you'll see that it flows more slowly than it would at room temperature. For most liquids, viscosity is greater at lower temperatures. It's these two things--the comparison of one liquid with another and the effects of temperature--that we explore using the materials in this SEEDKIT.

Why did we create a SEEDKIT around this particular topic of viscosity? There are two reasons; one is that viscosity does come up very commonly in school science curriculum at different age levels and different levels of sophistication. It is a relevant topic to our audience of students and teachers. Also, as is the case with much of the science content that we have on the SEED Web site, it's based on Schlumberger expertise. Viscosity is a factor that needs to be considered in our industry. For instance, how easy or difficult it is to get oil out of the ground is in part related to its viscosity. Viscosity is an important property of the drilling fluid that is pumped into the bore hole while a well is being drilled. We have an article on that on the SEED Web site which is also included on the DVD that is part of the SEEDKIT. It's called "Drilling Fluid: Lifeblood of the Well" and it gives an explanation of what drilling fluid is, how it is used, and various other factors.

Let's look at what is included in the Viscosity SEEDKIT. It's based on the content on the Web site so what you are looking at now is the properties of liquids index page on the Web site and there are quite a few activities that are listed here. Nine of them are actually about viscosity; so you see, we have Viscosity and Temperature, Viscosity Explorer and so on.

The focus of this SEEDKIT is to compare viscosities of different liquids with each other and the effect of temperature on the viscosity of a particular liquid. These experiments involve filling a plastic bottle with a liquid and then dropping a marble through it. For example, here is the Viscosity and Temperature activity. What you see is a clear plastic bottle and you put a liquid in it. It could be water, shampoo, oil. You drop a marble in and there is a line near the top and a line near the bottom and you time with a stopwatch how long that marble takes to fall through the liquid.



There is another activity we have which is on the Web site and also included in the SEEDKIT. It's called the Viscosity Explorer. This is a simulation and what you should be seeing now is a blue screen with two containers. We have these two grabbers up and they each hold a marble and then you determine what liquid is in each container. Right now, we have water in one, olive oil in the other. When I drop the marbles, what you see is the marble drops pretty quickly through the water on the left and drops more slowly through the olive oil on the right because the viscosity of the olive oil is greater. You can change the temperature of each of the liquids--you can see that there is a little fire under the container to warm it up. You can also chill it with a little dry ice, like a CO₂ fire extinguisher blowing on it. This lets you compare liquids and test the same liquid at different temperatures. The Explorer replicates what's in the SEEDKIT in terms of hands-on activities.

You also have this virtual activity and they work very well hand in hand. Water, oil and shampoo are what are called Newtonian fluids because they behave in a way that follows a model that was originally described by Isaac Newton. Basically, the harder you push, the faster they flow. But some liquids don't follow this rule and these are called "non-Newtonian" fluids and they have odd behaviors. Did you ever notice what happens when you try to pour ketchup out of a bottle? Often it seems like it is stuck. You shake it harder and harder, but nothing comes out and then suddenly, all of a sudden, a big blob comes out and drowns your potato fries. Ketchup is what we call a "thixotropic" liquid and the property it has is that when it sits still, its viscosity is high. So while it's sitting in the bottle, it is very viscous and when you agitate it or stir it, the viscosity drops. That happens suddenly, which is why it all pours out of the bottle at once.

Now, what does this have to do with Schlumberger and the oil industry? Well, we have a product at Schlumberger called Visplex and it behaves like ketchup. It's used in drilling fluids and the idea is that the drilling fluid circulates when the well is being drilled. It's pumped down into the bore hole and then circulates back up. One of its functions is to carry the cuttings (the little pieces of rock that are cut off the formation as the drilling progresses) up to the surface. As long as liquid is circulating, these rock cuttings get carried up. However, there are times when you have to stop the pumping or stop the circulation to add a piece to the drill stem, for instance. In this case, what could happen is all of those cuttings would sink to the bottom of the hole and this bore hole could be several kilometers deep and that would clog it up. If you have a thixotropic fluid in there, as soon as you stop pumping, it gels and that suspends the cuttings. They don't sink and then when you start pumping again, just like when you shake the ketchup, it becomes liquefied and the circulation resumes.



This experiment you are looking at now, “Ketchup: Thick or Thin”, is designed to demonstrate that situation. What you do is drop these little weights into a beaker of ketchup and you time how long it takes for them to get to the bottom. You do the same after you have stirred the ketchup and you see if its viscosity has been altered.

There is another variety of non-Newtonian liquids which is called dilatant. These have the opposite characteristic. When they are agitated, they become more viscous and when they sit still, they become less viscous. The common example of that is cornstarch and water. Here you see someone playing with this gooey, gloopy mess and if you try to poke your finger into it, it doesn’t move but if you slowly push your finger into it, it does move. Wet sand at the beach behaves somewhat like that, as well as quicksand.

There is a really fascinating video we linked to on YouTube: a pool filled with non-Newtonian fluid. A bunch of students got together and filled this pool with cornstarch and water mix. As they were running across the pool, they didn’t sink. They were actually able to walk on water! But as soon as they stood still, they sank into it. That’s a really nice video that demonstrates this characteristic.

Those two activities (the ketchup and the cornstarch and water activities) and the materials for them are not included in the SEEDKIT, but as you can see, they are not that difficult to obtain. The instructions are all there. What you are looking at on the Web site is duplicated on a DVD, so you have what we call a mini-Web site. If your connectivity isn’t good, you can have access to all of these activities, locally on your computer.

That’s an overview of the Viscosity SEEDKIT. A few details on the logistics of this kind of workshop if you are going to do it. How long does this workshop take? Each of the activities can be done in a typical class period of about 45 minutes to an hour.

As a volunteer, how do you make arrangements? It depends, if you are already in contact with the teacher or the director of the local school, you can just go and do it; talk to a local school and set up a workshop. If not, then you should contact your SEED Country Coordinator and the Coordinator can make introductions for you to the schools because they are in touch with the people in the schools.

Is this only for SEED schools? No, SEEDKITS can be done in any school whether it is a SEED school or not.



What should you do with the SEEDKIT after the workshop? Well, there are a couple of things. You can keep it and use it again. You can leave it with the teacher and the DVD part is copiable, so you can make as many copies as you want. You can install that on the hard drives of the computers in the SEED Labs, so people can use it in the future and you may want to leave all the materials (like the bottles, the marbles, the stopwatch, etc.) with the teacher so that the teacher can also share them with other teachers in the school. And you may want to get additional kits. But be reminded that if you already have the DVD, you don't have to order another kit. Many materials are available locally. You can just go out and get plastic bottles that are equivalent. You should check back with the teacher a few weeks later to see what follow-up has been done, anything else you can do and if there is any interest in further activities. Maybe, if you've only done one or two of the activities, you could follow up by doing the others. So that's about it.

Has anybody out there used this material? The SEEDKIT is very new.

LOVE ZUBILLER: Thanks Michael. I did receive a question sent to me so I'll go ahead and ask it at this time. "How many kids and/or teachers can use the SEEDKIT at one time?" The kit can be used for demonstration in front of an entire class. It's much better for the students to carry out the activities themselves in groups of two or four students. For an entire class divided into groups of this size, you'd need a few sets of materials. Alternately, you can arrange with the teachers to take one group at a time with the rest of the class being engaged in another lesson with the teacher. Just a reminder that the kits can be used multiple times. That's true with all SEEDKITS. Some of the materials might need to be repurchased when they run out. For instance, in the Fruit Power SEEDKIT, you are going to need to get new lemons every time you do the new experiment.

MICHAEL TEMPEL: Right and we don't include the shampoo or the oil or any of that in the kit; you have to get those locally.

LOVE ZUBILLER: There are sometimes in other SEEDKITS; there are other items that you need to procure locally. As Michael said before, we encourage the volunteers to leave the SEEDKIT at the school so that the teachers can incorporate it into their curriculum. Soon teachers will be able to register in their own community on the SEED Web site, which is really exciting for us. When you work with the teachers, we hope that you engage them in more SEED activities and get them more involved in SEED.

It looks like there is another question, "Does the SEEDKIT contain the instructions in different languages?" Yes, the answer is absolutely. It comes in seven languages.



Everything comes in one kit in seven languages and those are: Arabic, Chinese, English, French, Portuguese, Russian and Spanish.

MICHAEL TEMPEL: I'm just switching the Web site page to Spanish. If you are on the Web site, you can switch to any of the seven languages just by clicking that language up at the top here. And the copies of this in all languages are on the DVD.

LOVE ZUBILLER: We have another question. "Can I use any liquid in the viscosity workshop?" Michael, I'll let you answer this one.

MICHAEL TEMPEL: Yes, pretty much. The limitation with the way this particular activity is set up is that the liquid needs to be transparent because you are dropping this marble through it and you have to be able to see it. For example, you can use honey; that's perfectly good, or corn syrup. You would not want to use molasses because it's opaque. There is another activity that we haven't developed but just some of you may be familiar with it. There is a device called a Marsh funnel that our field engineers use to quickly check viscosity of drilling fluid. Basically, it's a funnel with a narrow spout and you fill it with a liquid. As the liquid runs out, you time how long it takes to run out. If you obtain a funnel, you can do that and in that case, you are not looking for a marble dropping through so you could use opaque liquids as well. Now the other consideration, of course, is safety. You probably don't want to use gasoline or sulfuric acid and stuff like that. But as long as the liquids are clear and non-toxic, anything goes.

LOVE ZUBILLER: One more question. "Are there other SEEDKITS on topics besides viscosity?" And the answer is positively yes. Right now, we have five SEEDKITS that are available in SWPS and the SEEDSTORE. As we mentioned before, we have Fruit Power, which is really fun. You can make a "Frankenlemon" or a "Frankenstein" out of a lemon. We have Viscosity as we went through today. We have something called Smart Wired which you might have been introduced to before. This is a 45-minute activity that you do with students. It's not science related, but it helps you understand the learning style of the student. We have done it in a lot of workshops around the world and the results are really fantastic. This is one, in particular, that any volunteer can do with their own children, like all the other SEEDKITS, of course but this one, in particular, is good to get to know your own child's learning style.

We have a SEEDKIT called Connected Wisdom, which is going to be introduced later this year so you'll hear more about that. And the last one we have is Malaria and You, which we did a Webinar on that last month. That's a really neat one, especially because Schlumberger is in so many malaria-prone countries and it teaches effective ways to help



prevent malaria and help prevent the spread of malaria. We have those five SEEDKITS that are available now and we are introducing another five in 2010 so you'll see more of them. We really hope that all volunteers can become pioneers and take these to schools in their areas. The great thing about SEEDKITS is that you don't necessarily have to do it in a SEED school. I mean, that would be great, but you can do it in any school, in any country, around the world. You don't even have to do it in a school. You can do it with your own kids; you can do it in a summer camp, anywhere that you want to get students interested in these topics.

So I see another question. "I love giving opportunities to my students to experiment on things like this but our school does not have enough financial allocation for this. I wonder if SEED still gives out free kits." Everyone who is attending this Webinar today or the first 15 people who registered will receive a free Viscosity SEEDKIT sent to you in the mail. The answer is absolutely! We will be sending you one and we'll get in touch with you after the Webinar to work out the logistics but we are very happy to share these with you. Also, if you work in a country where there is a SEED program (there are 42 countries right now), you can speak with your Country Coordinator and they can help arrange getting SEEDKITS to you, or to your school, if their budget allows. SEEDKITS are priced very reasonably for this type of activity. You can always work with your Country Coordinator or if you're doing this as part of SEED, you can potentially talk with your manager about expensing it through the company. Of course, always speak with us at SEED because we can see what we can do.

MICHAEL TEMPEL: Now also, keep in mind these kits are based on low cost materials. A lot of the activities on the Web site were deliberately designed that way so they don't use fancy stuff and, in this case, the only pricy item at all is the stopwatch. I mean, the rest of it is just plastic bottles and marbles so they can be gotten locally in quantity as well. And soon, you will be able to simply download all of the DVD files from our Web site. In other words, it doesn't even have to be ordered. We mainly package these as a convenience but you can look at the materials on the Web site and put them together yourself.

Let me show you how to get to the page where you could order SEEDKITS. First, go to the home page of the SEED Web site.

On the home page, at the top right, there is a tab that says "Community". When you click it, you come to the Community page and on the left, in the gray area, there is a link to SEEDKITS and that's what you need--the page that shows the five current ones and it'll grow as time goes on. There is "Viscosity", if you click on "Viscosity," you go to the



page that's about the Viscosity SEEDKIT and this includes a video which introduces it, two more videos which step you through some of the activities. These are also the content items that are on the DVD so it's "Viscosity of Liquids" and there's also a workshop outline and a power point slide show that you may want to use in the workshop. There are two ways to order: first, you should order from the SEEDSTORE if you are not a Schlumberger employee or contractor; and second, you should order from SWPS if you are a Schlumberger employee or contractor. Also, there is the Webinar schedule: last night's Webinar and the one we are in right now. Any future Webinars will be posted here.

LOVE ZUBILLER: Thanks, Michael.

Michael and I and all the SEED experts are available to answer any questions you might have about SEED, or SEEDKITS, or viscosity, etc. We'll send an email follow-up to everybody with instructions on how to get in touch with us and also details on receiving the free SEEDKIT. We will also send you a brief survey that we hope you will complete right now to give us feedback on this Webinar so that we can improve. If we do provide the SEEDKIT to you, we ask that you send us feedback in the future on how it went and again how we can improve our SEEDKITS. We will be following up with you in the next couple of months once you've had a chance to do the workshop.

MICHAEL TEMPEL: And Love mentioned "Ask the Experts." If you go to the bottom of any page on the Web site, there is the link "Ask the Experts" and that opens the form where you can submit a question. Also at the bottom of every page, there is "Contact Us," which is another link to get in touch with us.

LOVE ZUBILLER: Thank you everybody for coming. We appreciate your time and we appreciate your interest in SEED. We look forward to hearing from everybody soon so have a nice afternoon, a good evening and a good night.