Trey: Hello, everyone, and thank you all for joining us. Today's webinar, "Using Solvent Replacement as An Opportunity for Cleaning Performance Enhancement," is presented by the household care business of Evonik. Your presenter today is Eric "Rick" Theiner. Rick Theiner has been working in the field of household industrial and institutional formulation in a variety of roles for over 25 years.

Most recently, he's been focused on surfactant research and development specifically for this market area as a senior principal chemist for Evonik. He's made numerous presentations to industry colleagues and customers and led classes on formulation methods in chemistry. He earned a bachelor's degree in chemical engineering from Christian Brothers University in Memphis, Tennessee and a master's degree in physical chemistry from Lehigh University in Bethlehem, Pennsylvania.

My name is Trey McDonald with you UL and I'll be moderating today's event. You can send us questions by typing in the question box located on your screen, then our panelist will answer them at the end of the presentation. We are recording today's event and will send you a presentation via email when the slides and video have been posted to the UL Prospector Knowledge Center. With that, I'd like to turn the presentation over to Rick. Rick?

Rick: Thanks very much, Trey. And thanks to everyone for tuning in and paying attention to what I have to say today. This actually fits right into a typical philosophy that I have as far as formulation goes, which is, whenever we're going to change a product, we have an opportunity to make that product better. Sometimes we have to change the product due to forces outside of our control, and that's what a lot of this solvent replacement is about.

Let's talk about...first though, what is a solvent? You know, those of us that typically formulate cleaners for the HI&I market have very specific ideas as to what we mean by solvent. But my idea may not be exactly the same as yours. So what we're going to be talking about today are specifically the organic solvents that fall under the polar or the nonpolar category.

Under the polar or the more water soluble solvents, we've got things like the Pyrrolidones, shorter alcohols like isopropanol, and ethers such as 2-butoxyethanol or ethylene glycol monobutyl ether, which is another term for it. Under the nonpolar, we have thing [inaudible 00:02:10]. These typically go into hard surface cleaners in a small to large amount, depending on what exactly is the goal of the cleaner. If you remember, I think I use the same slide the last webinar that I gave, in which we talked about how you go about putting together materials for a typical hard surface cleaner. And you can see that solvent is almost always present. And it is there because a lot of times it helps out to speed the dissolution of soils and the drying of surfaces and generally give us synergism to the surfactant performance.

The problems however are that a lot of times they're volatile. And VOCs are being clamped down on in areas such as California, the OTC states, where they see them as a contributor...well, they are a contributor...to ozone. There are often toxicity concerns. The odor can be offensive, but, really, the biggest thing that we have is public perception. Public perception is what drives a lot of what we do. And in fact, I selected these pictures on the right side of your screen to kind of show...you know, and these are actually rather attractive pictures showing the industry and nature coming together I think. Nonetheless, there's an undercurrent of, "Oh my gosh, there must be some danger there." And so when someone says, "I'm using a solvent in a product," the public thought is, "We need to get rid of that."

Now, solvents that are often used in HI&I cleaners can bring some problems with them. And in fact, I've pointed out some of the problems for some things that are typically used in the HI&I hard surface cleaners. You'll notice there's one that doesn't seem to have a whole lot of a problem there, but everything else does bring some problem to the table. And we'll touch on that one...its shorthand is TPM, and you'll see there's no check marks for it, and it has its own problem in that it just doesn't work particularly well.

Now, why do we like solvents? Well, we like them because they speed drying, they aid in removing water-insoluble soils such as heavy greases and things like that, and they can help to lower the surface tension by taking up room at the interface where the surfactants sit.

There's a little bit more though that they do, such as lowering the surfactant contribution to micellar mass, they speed surface exchange, and these are kind of thermodynamic things that are going on behind the scenes that really impact how well our cleaners work. And the bottom line of it is that it helps things to clean. So the way that we look at this a lot of times is, what can we do to mimic these types of effects so that we

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

get better impacts in cleaning without the solvent contribution?

So how do we go about looking at solvent replacement? Well, we can just take it out and then see how well your product works. Or, we can take the approach of looking at the solvent and the surfactant as a unit because they are providing a synergistic performance. We can either reformulate so that the performance is maintained with no solvent, or we can even take a product that's specifically targeted for this type of thing, I should call it "drop-in" option, to replace the solvent. And we'll be talking about all three of this.

We'll talk about the first one right now. What if we just take the offending material out of the formula? Well, that's kind of a bad idea. And the reason why is that first of all, you're changing the aesthetics or the perception of the product right off the bat. You know, I mentioned that smell. A lot of times people smell that and they think that the product is therefore going to work, or it's going to work the way that they expect it to. We actually did some work with a relatively big consumer products group that made the point that as we removed one of the solvents, we were going to be changing the odor profile. And they needed to fix that through the fragrance that they incorporated it. And so just taking it out, changes that.

But the second thing it does is that it's going to change the stability of the product if that solvent is there helping to couple everything together, or in this case of the third point, they'll shift it in the cloud point. If it's a hydrophobic solvent, it's actually going to move the cloud point higher which as formulating chemists in this area, we know that a higher cloud point also means lower performance. And it's also going to change the wetting and emulsification properties. So generally, you don't just want to take the solvent out, you want to figure out how to get around the use of that solvent. So really, it's time to reformulate.

Now, let's take another look again. Why do we like the solvents? Well, they speed drying and they aid in solubilizing greasy soils. The...someone change my slides. The speeding of the drying is something that we can't really address if we remove the solvents because it's that VOC effect, it's the volatile effect that leads to the speeding of the drying. So that's something that we're just going to have to get around. Or in fact, actually it's something we're going to live with.

But in terms of aiding in the solubilization of the greasy soils, that we can deal with. And let's take a look at a little bit more of that. The way to do that, if you remember from my formulation webinar, we asked what is the substrate, and we asked, what is the soil? And by doing that, you can fit your charge to the surface to speed the wetting and/or, you can look at the soil and match your hydrophobe of your surfactant in order to interact with that soil more effectively.

An example of how we can do that right here is in removing hydrocarbon soils from glass. Now in this formula, you can see Formula 2 uses 10% of a VOC solvent and 3.25% of a nonionic Tomadol 91-6. Let me see if I can get a mouse up there. Yeah, there we go. 91-6, right here. Ethylene Glycol Butyl Ether, right here. What we did in this formula was, we removed the 10% of the solvent and replaced it with some two surfactants and amine oxide which has a nice affinity for glass, and a Q-14-2 which has a nice hydrophobe that works very well with interacting with a greasy hydrocarbon soil.

And in fact, by doing that we could even lower our overall surfactant load. You can see, here we have a really good approach in terms of removing that solvent and maintaining our performance in this given application. Now, as far as taking another approach, let's take a look at considering the concentration at the end use. Now here in this case, what we've got is we've got three different options. On the far end, you're going to see your control...where's that mouse? There it is. Here's the control which utilizes 8% of that VOC solvent, 2% of the nonionic Nonoxynol-9 [inaudible 00:09:45], and over here we've got a workhorse nonionic surfactant, and then an optimized nonionic surfactant, and then a cationic nonionic blend. The point that I want to make here is that when we're using a huge slug of this, 5%, we can replace that solvent in that nonionic surfactant with our optimized surfactant blend, greatly outstripping it, at 5% versus 10% total loading of the other.

If we drop our concentration, then our optimized cationic nonionic begins to take over in terms of performance. And then if we look at it in even lower concentration of 0.5%, even though we're still getting good performance out of our control, that tiny amount, relative tiny amount of the optimized surfactant system versus our control still shows the good performance effect. So my point is that by taking a close look at what type of options that you have and considering the concentration, you can figure out, "Do I want to take a nonionic route, do I want to take an optimized cationic nonionic route, or what?"

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

Or, a much simpler way to approach this is to take the easy way. Now I'm going to make a brief segue here for just a moment and say that when I decided to find a picture that would exemplify taking the easy way, this was the one that I found. And it just so happens, that this is the exact shop where my wife and I would purchase our produce, our fruits and vegetables in Memphis, Tennessee while I was living there. So I was very amused to know that now I can actually pay back Easy-Way by throwing in some free advertising. The easy way is the best way.

The first easy way is to take TomaKleen G-12 Additive. Now, if you remember I was talking about the micellar impacts and the interfacial impacts that are due to the solvents. And what you see here with the TomaKleen G-12 is a nonionic surfactant that is specifically designed to mimic the type of kinetic responses that we get from utilizing those solvents. By using this fast cleaning that's driven by fast kinetics, we can optimize our formulas and get those type of solvent interactions. And above, all it's not considered a VOC material. In fact, it's on Cleangredients and it is utilized to fix formulas that the CARB sees as problematic.

To show you what I mean by that, let's take a look at replacing 4% of VOC solvents, or a non-VOC in the case of the TPM and the DB, and replacing that 4% with 1% of the TomaKleen G-12. You can see that it does a great job in terms of removing this industrial soil on stainless steel. And if you go back to what I was commenting on in terms of the cationic interaction with metal, both earlier on in this presentation and in the formulation presentation, you can see that we don't need it. We can actually utilize a nonionic system in order to meet that performance need.

An interesting effect here is that, again, it does the exact same thing when we completely change the substrate in the soil, 1% of the TomaKleen G-12 outperforms 4% of traditional oxygenated solvents. So this is a great opportunity to make a very simple change in order to gain the benefit of removing solvents from your formula and improving your performance. Another thing that I'd like to point out here is in terms of continuing to remove these materials, we can approach DPnB, yet another solvent system that is very effective typically in lowering your VOC content but getting a better use benefit, and therefore a better cost benefit overall by utilizing the G-12.

Now, let's take another look here, is as we continue to change the different types of formulas, we can still improve this, and by changing the types of soils, we can still improve this. This is actually a neutral formula versus the alkaline formula that we saw in the previous slide. And again, we've got G-12 outperforming the other materials. Now, here's one thing to be aware of though. As we approached this, we didn't consider one thing that's very important (that) solvents can help us do, which is couple in the system and improve the overall stability, if you remember me talking about how that can change our cloud point effects. So we've figured out what we could do here, which is, in the case of taking our Ethylene glycol EB which brings the Tomadol 1-5, a relatively insoluble nonionic surfactant, into the system.

What are we gonna do if we take that EB out, our 1-5 is gonna have a hard time getting in there? In this case, we utilized another material called Amphoteric-12. In fact, we found great synergies between the G-12 and the Amphoteric-12. And it's just a coincidence that they both happen to have 12 in their name. But one thing that we like to tell our customers when they're formulating with these materials is if you need a specific cloud point response, and you're gonna lose that when you take out of your oxygenated solvent, then the Amphoteric-12 is a good way to go about it. And in fact, we say, "Keep the 12s together." That was something that one of our sales reps came up with and I thought it made a lot of sense.

So the thing to keep in mind about kinetics though is that they're always temperature-dependent. Oh, before I go to temperature dependency, let me talk about, really quickly, about the fact that we are not optimizing this product. This is something that happens a lot of times. We didn't optimize this product, they were only used with our surfactants. If you're currently working with a formula that does not utilize the types of surfactants that we put together at Evonik and you're using someone else's, this competitive nonionic for example, it still works. You don't have to make sure that you've completely changed your formula. You can simply take this one material and drop it in in order to make a good response. And again, you can see that we're using 3.5% of the G-12 versus 9.7% of the Glycol Ether EB.

One of the ways that some people will actually utilize various solvent characteristics in terms of figuring out what works best for cleaning is using something like the KB value or Hansen solubility parameters. We've developed our own list of the Hansen solubility parameters for the TomaKleen G-12 additive so that, if you are utilizing this type of a method to optimize the way that you solvate your soils or material that you're trying to put into solution, you can utilize the solubility parameters here as well. And you'll notice that the polar and

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

the dispersive and the hydrogen forces that are all present here in the Hansen solubility parameters, actually move around within the same zones that these oxygenated solvents typically use move in as well. And at the same time, you don't have to worry so much about the solvent odor.

Now, if you're going to be using a solvent to remove greasy soils, one of the big things that happens a lot with greasy soils, which is, they get onto fabric, so we did take a look at utilizing the same G-12 in fabric, and as a pre-spotter, you can see that it does do a good job of going after greasy soils in fabric as well. I showed the really heavy duty greasy soils but really these are the list of all the things that you're going to be finding. And the bottom line is that utilizing our formula versus the commercial formulas that we simply pulled off the shelf, a very basic formula that goes after greasy soils and we threw in some protease to go after the protein soils, again, it outperforms those standard commercial formulas.

And we're not talking about the cheap stuff, we actually got the really good things whose names I'm not going to use because they're customers of ours, but we're talking premium pre-potting formulas. Now, as we worked with the G-12, we realized that we had an opportunity here to present to our customers something that was even beyond a drop in replacement for solvents. Because a lot of times you may simply say, if we're going to reformulate, why don't we just trash our current formula, or rather relegate it to a second-tier position, and put out for our customers a much better type of product that does not have the solvents present in them.

That's what Tomadol 902 is for. It's really for allowing you to create a whole new system and it brings in the kinetic benefits that you get from the G-12 in how we formulated it. So this is the material though, I mentioned the Tomadol 902 and its specific types of benefits. You'll notice that if you look on the chart on the right, down towards the bottom, there's a VOC content under EPA Method 24. In reality, this is what we call an LVP VOC or a Low Vapor Pressure Volatile Organic Compound. The problem is that sometimes when we run an EPA Method 24, even that little volatile percent that's left over from our reaction method is going to give you some of that VOC contribution.

And it's hard to explain to the people, the regulating agencies a lot of times, no, the whole thing is exempt because of the way the regulations are written, when all they're looking at is their GC saying, "Well, wait a second. It shows that you've got some VOC component." It's a very low amount. It's 2.7% VOC, so if you're using a percent of the surfactant, then you're really only going to get 0.27% of your VOC, so it's a minimal contribution. But I did want to point that out in case it ever came up for you.

So what is the benefit of utilizing the Tomadol 902 surfactant? The benefit is that it greatly outperforms the removal of soils as compared to your traditional nonionic such as NP-9 or even the competitive products that are out there that are formulated specifically for these types of materials at a much lower use level. Again, we take another look at this in terms of our speed of cleaning. After six minutes, you can see that in this particular standardized test, we stripped the soil right off with the 1% 902 versus the 1% of the other materials.

Now you can go one of two ways: You can say, "We're going to make a much more effective formula utilizing the same level," or you can say, "We're going to use much lower amount of the surfactant in order to get the same benefit." And you get to make that choice as to whether you're going to save money on your surfactant package or if you're going to improve your overall performance. Now, one other thing that I'd like to point out though, and this is the reason why it's in this presentation, is that by putting it together, you get to move away from your VOC solvents.

Here are two formulas that show a, you know, basic builder package that you're going to typically leave alone when you're reformulating because you're only looking at the solvent surfactant combination. And in this case we've got 0.65% of your surfactant and 1.6% of your VOC solvent. In our case, we simply take out both of those things and put it in 1.3% Tomadol-902 and match the performance. In doing so we drop the VOC level and in fact probably even save a little money in the process.

So the thing that I wanted to point out before when I got ahead of myself was regarding temperature. Temperature of course is always a driver for kinetics and the thing that we showed here is that because of our more kinetically active surfactants, we can lower our temperature and still get a good response. That's on the low side. If we go to the high side, then it just goes nuts.

Then we very quickly take off soil because we have the benefit of having things moving faster. In this

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

case...it doesn't have the temperature. In this case...oh, there it is. 50C. I was about to get concerned because I think that it's easier to believe me when it's actually written down, I'm just telling you that, nobody wants to just take it as said, but at 50C, you can see that it stripped the soil right off.

And this is what I wanted to talk to you about in terms of the cost. Tomadol-902, and these are numbers...don't quote me on these, because I'm a techie and techies are not able to actually get price quotes...but this is utilizing some rough numbers that will match up with what you can expect to see. And you can see that utilizing Tomadol-902 gives you an opportunity to really save some money, if that's what you're looking for, or it can really improve your performance, and, in this case, it can do both.

So what do we learn here? Basically all we've learned is that we're getting pressured to remove the solvents from more cleaning formulations and simply removing them is not really much of an option. We also learned that the attention to the details of a specific cleaner can guide you in making the right calls and the right formulation changes in order to get a good response. But the best thing, in my opinion, the best thing is that Evonik has done much of the work necessary to basically simplify your efforts so that you can easily make these changes without going through a whole lot of hassle.

Having said all that, I'd like to also invite you to come visit us at the American Oil Chemists Society Annual Meeting in Orlando, which is taking place the first week of May this year. Well, as it does every year. I'm actually going to be teaching a short course there in which we're going to be touching on everything. They've slated eight hours for me. So if you're really enjoying listening to me, this is a great opportunity for me to talk your ears off. If you don't, then you don't have to come, it's okay.

But what we'll be talking about is utilizing experimental design and analysis in order to maximize your product performance and formulation, and actually solvents are going to be a bit of that talk. And throughout the week, Evonik is going to be presenting some talks as well, one of which, The Sophorolipids, I'm very excited to be hearing about, that's going to be presented by my colleague, Xiang Wang [SP]. And those are the bio-based surfactants that we are currently bringing to the market, you'll probably be hearing more about those in the future. And of course if you have an interest in more information, please don't hesitate to contact us, we'd love to hear from you. And with that, I'm going to pass the presentation back on over to Trey.

Trey: All right, Rick. Thank you for that really great and informative presentation. We are going to move into our question-and-answer session, and we've already had a lot of great questions come in. So while Rick reviews those, we just do encourage you...we've got a great technical expert in Rick on the line here, so please send us your question. We will get to those here in just a few moments. A couple questions already coming about, where can I get a copy of the slides, where can I get a copy of the presentation? We will be sending that to you via email in the coming days, so do be checking your email for that. With that, we'll go ahead. And we have got a lot of great questions already, so please continue to send those in, I will pass that back over to Rick and we can go ahead and get started on questions.

Rick: Okay, thanks a lot Trey. The first question that I got was regarding the TomaKleen G-12. And that question unfortunately, I'm not going to be able to answer outside of a general. The question is, what is the chemical name of TomaKleen G-12, and I'm sorry to say that the actual chemical identity here or the structural identity, is not something I can disclose. Sorry. I can tell you that it's a nonionic and it is indeed a surfactant. It is a surface active agents against, theough that's the reason we get the great kinetics out of it is because it is surface active and it migrates...interacts with micellar structures.

And the second part of that is, what is the source? Is it petrochemical or renewable? And that is a great question. I will tell you at the moment, it is a petrochemically-derived material. However, we do have the opportunity to make it out of renewable materials as well. In fact, our first generation of the G-12 is a renewable source. Unfortunately, the petrochemical is less expensive and that's the reason why we're going down that road. If you have an interest in a renewable version of G-12, I encourage you to talk with your Evonik rep because we may be able to put that together for you.

Okay, next question is, how did we quantify the percent soil removed in our cleaning tests? Very good question. We have two ways of doing that, one of which is to take a picture and utilize a pixel count in order to determine the amount of soil that's removed. But we also have a second method it is called Khalil. Khalil is a guy who works with me and does a lot of our cleaning tests. Khalil actually has a visual acuity that matches our pixel count, it's amazing. But he does something else too, and that is you will notice sometimes that blue dye gets much darker in some of those pictures and that's because the material has been moved.

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

And so, even though it looks like we have a clear space, that soil has not actually been removed. Khalil can take that into account in his own determination, but the pixel count cannot. And so a lot of times we utilize a Khalil's input in order to come up with the percent soil removed.

Let's see, my questions keep moving as more pop in, so let me slide up here. Do I know off hand what the VOC limit is? Well, it depends on where you are. But in terms of general hard surface cleaners in the HI&I area, it is 4% the last time I looked, but I believe they were talking about taking that down lower to below 1%. And I know that...I have some friends that are on the line, and if you want to throw details on that, in that questions, and you know who you are, I'd be happy to spread that out to the rest of the group.

Have we used the G-12 with DBE? Yes, we have. And that can be seen as one of two things. Have we used with the solvents in order to see if we get an even better effect when we're combining that cleaning with the solvents, and yes we do see that. That was outside the scope of this presentation, so I didn't put that in there. The other side of that is have we compared it against the Dibutaxyl Ethanol? Yes, that that is something that we also...in fact, it was in the slides. We did compare that against the DB to a certain extent and generally it outperforms it easily.

Is there HLD information for the surfactant? So this is a guy after my own heart. For those that are not familiar, HLD is a new way of classifying surfactants and oil interactions that's coming onto the scene. It's not that new, but it's new that it's being looked at as carefully as it is. We do have the characteristic curvature of our nonionic surfactants. I would encourage you to contact us and that will probably filter its way over to me and I'll provide you with not only the G-12, but a lot of other things that we have.

Has TomaKleen G-12 been tested against any bathroom or shower soils such as soapstone? That's a really good question. And I will be absolutely honest. No. And the reason is that is a really difficult soil to put together, and so typically we look more on the alkaline side in terms of our formulations. I mean, unless on the bathroom cleaners side. We can do that and we will do that if you really have a burning desire to know how that works. If you'd like to try it and let us know, that would be great too.

Let's see. I noticed the SDS for these Tomadols show no Prop 65 flags. This is good but unusual for nonionics. Oh. Hey, I love this question. Yes, you're right, it is. The reason why we don't have that on there is because, as you said to me in the end of your question, we do add an extra refining step, or actually an extra stripping step, to ensure that we don't have residual ethylene oxide present in the surfactant. That's how we stay away from the Prop 65. So thanks very much for that.

Okay, let's see. We scroll down a little bit more. Is Evonik working on any direct release surfactant products? Yes, we sure are. And that's...yeah, but that's kinda how I have to leave right here because in terms of the direct route...

[00:32:18]
[silence]
[00:32:28]

...service people in order to find out where the current status is because things change and think new things cut...and old things go off, and so I can't really say. But yes, if you're looking for direct release, please come back to us, and I know you will, the person who asked that question, and we will address that. And by the way, the California VOC limit for general purpose cleaners and de-greasers is now 0.5%. Thank you very much Carol for providing that information.

Rick, are you in Europe to discuss the experimental design approach? I'm not sure I understand the question but I am currently located and generally located in the U.S. on the East Coast. I am available to go wherever is necessary for me to go in order to do that. And in fact, something that I do with some regularity is actually going to relatively large customer groups and conduct training. So I can certainly help you out with that. If you're interested, just give us a call and we can talk about it.

Is the cleaning strength similar for other substrates? Yes, that's a good question. Yes, it is. There's only so much information that we can really provide during any of these particular tests. If you have specifics that you're interested in, such as glass, porcelain, polymers, things like that...I'll tell you polymers are hard to give good pictures of and so a lot of times we stay away from that because they also absorb the dye that we use to show the soil removal, and so we typically don't put pictures of that up there, but we do have data on that.

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

I encourage you to contact, we may have some more information on that.

How much of foam do TomaKleens generate? The G-12 is a moderate foamer. It produces a low-level of foam. It is relatively stable, it's not a flashing foam. The 902 produces more foam than the G-12, but it is a flash foam and is rather unstable. In both cases, we can say you can combine them with low foam surfactants and often they will modify their foam to match that at the lower foam surfactants. But they themselves will generate some foam.

What were the cloud points measured, the two formulas, one solvent and one without? The cloud points we generally shoot for over 120 degrees Fahrenheit, which is around, is that 40C, 50C. Thank you for my audience participation here in this room. So that's our target for our hard surface cleaners when we test them. The way that we measure them is simply to put a thermometer into the formula, heat the formula, remove the heat and we measure on the downside of that. So once the formula comes back together after clouding, that is when we take the reading.

Okay, what is the distributor in Canada to request for samples? Not sure if this counts as a...well, yeah, I'll tell you. It's Canada Colors is our distributor in Canada.

Okay, scrolling down a little bit more. AkzoNobel claims that you can replace eight parts of EB with one part Berol 226 SA and maintain de-greasing performance. Have we done any comparison tests with Berol 226 SA? Absolutely, yes. And in fact, I will tell you that in some of those slides where we mentioned competitive materials, particularly the ones where it's at NP-9 and then competitive materials, some of those were Berol 226 SA. Not all of them. Some of them were a different material. I feel safe saying that product name, since you asked about it, I don't feel like I can, you know, specifically like I try to stick a knife in our competitors by pointing out their names. It just seems kind of mean. But, yes we have tested against the Berol 226 SA. That's one of the things that we always make sure that we can now perform.

Any of the standard soils are methods used in soil removal evaluation, ASTM or Authorized Standardized Methods? You know, it's difficult to get good standardized methods. There is one, the ASTM 4488. That has been used by a number of folks for a long period of time. It's commonly referred to as the garden or scrub method. And even it has been decommissioned by ASTM simply because they don't feel like it's reproducible enough.

One thing that we have determined is that a lot of times when we do our own testing, the best way to do it is just as I showed you in those slides, is comparison methods. Try to prepare a soil that is comparable to what you'll be encountering. Apply it in a uniform manner to the same type of substrate to produce different slides and then compare one versus the other versus the other here. And that basically is a way that we can make sure that we can see how one will perform versus the other. But the problem is that you can't really age those, or if you do age them, then make sure that you're using all same substrates of the same age, etc. You have to minimize the variables as much as possible and then comparison tests work pretty well. But it's only on a comparative basis. There are no absolutes in cleaning formula evaluation that I am aware of.

Are there recommended surfactants to work well to solubilize fragrance soils? Good question. Really, it's hard to say because fragrance soils vary so much that some surfactants will work better than others in terms of solubilizing. Thank you for asking that though because it also allows me to say G-12 is not a great emulsifier. It's very good at getting to an interface and causing the soil to release, but it's not so good at solubilizing fragrance. Tomadol-902 does a better job of that. And sometimes it won't do as well a job as say, an EB will. And so, you have to go back and look at different noninonic, or in some cases maybe even cationics, in order to see...well or anionics, for that matter...to see what would work for your particular fragrance soil. I'm sorry there's no good answer for that.

Cloud points to control foam with G-12. I'm sorry let me explain the whole question. Have we ever toyed with cloud points to control the foam of G-12? Now, for those that might be wondering about what that means, basically once you hit the cloud point, you produce an oil phase because the surfactant becomes non-soluble. One thing that works really well with that are EOP or block polymers such as the Pluronic type of materials. See, I can say that because I'm not talking bad about them.

So anyway, so the Pluronic type materials do a good job of doing that, say 2502, that's a good one. Have that ever worked with those? Well, it just so happens, yes, we have. And that works very well in terms of minimizing the foam with the G-12 and I'll give you a second part of that which is that, and it does do a pretty

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

good job continuing to clean at that once we have hit that at cloud point of the G-12, or the G-12 system, utilizing the EO PEOs.

Next question. Does G-12 cause grazing of plastics. And I'm so glad you asked that question because I completely forgot to mention that. G-12 does not penetrate a polymer matrix. It's a surfactant, not a solvent. It acts like a solvent, and for that reason, it does not cause grazing the plastics. it won't leech the plasticizers as badly as a solvent will, and I'm not saying that it won't do it at all, I'm saying that it certainly will not do it as badly as a solvent will. And in terms of actually penetrating and causing the expansion of polymers, it will not do that.

And the question was if the G-12 is diluted to...shoot, the whole thing just shifted, where is it? Okay. If the G-12 is diluted to 1 to 100 instead of 1 to 10, are there any differences between G-12 and EB regarding the cleaning efficiency. That's a really hard question to answer because so many other things come into play. Basically, the problem there is that if you formulate with that big of a dilution, then you're going to get a good response. The big thing to be aware of with G-12 is that it needs to be surface active, meaning it needs to be in a situation where you've met the CMC requirement. Once you've done that, generally it's going to perform better than the EB. And I'll tell you the reason why, is that EB works because it's present in the bulk solution. It's spread all throughout it. It's not focusing itself at the interface. But the G-12 does. It works to get to the interface and that's where you want your cleaning to effect. And so if you dilute your EB that much, you really start to lose the benefit of the EB. The way to get around that of course is to put in a huge slug of EB. But at that point, you might as well be working with the G-12 because you can get away with much less.

Is this compatible with Tego SORB B 80, the odor absorber? Yes, no problems there. Absolutely compatible with it.

What are the surface tensions of the cleaners using the Toma products? Well, that's a good question. We a lot of times don't immediately measure the surface tensions when we're just putting together some slides to show how well we clean, and so I can't really answer that. I can tell you the surface tensions of the materials themselves are below 30 dynes per centimeter or a million Newton's per meter. But once you put the actual material together in a completely formulated system, it would be hard to say exactly where we'd end up.

Are they biodegradable or readily biodegradable? Yes. G-12 and Tomadol-902 are absolutely biodegradable. And is there a synergism between the Tomamine AO-14-2 and the G-12? That is going to be a formulation question. Yes, there can be. There absolutely can be because of the structural properties of both of those materials. In order to take advantage of it, you're going to need to use your formula, but it's certainly a good place to start. Amine oxides are typically great with glass and G-12 does not form a gel or a wrinkle when you put it on glass, and so you just gave me a great idea about utilizing both of those in a glass cleaner at very low levels. So yeah, there you go.

The drying time of the soil on the substrate and is there...? Can we tell you about the drying time of the soil on the substrate? In the case of the transportation, the oily particulate, we will bake those at 100C for 8 hours. It is a very difficult soil to remove. It's more of a paint than a soil at that point. But in the case of an oily soil, typically we will let those cure at room temperature for a day or two before using them. Sometimes it'll go as long as a week if we get called away on a different project before we get back to it.

Question here. You mentioned the increase in cloud point often signals a decrease in performance. Is the increase of cloud point often accomplished by addition of hydrotrope usually accompanied by a decrease in performance? That's a really good question, and the answer to that is often times, yes. That's one of the reasons why we actually will encourage people to utilize our amphoteric surfactants in order to build your overall stability of the formula rather than something like Sodium Xylene Sulfonate that doesn't really contribute to performance. And that way you can raise your cloud points in order to improve your stability while at the same time providing an impact, a beneficial impact of your overall detergency.

Is the 902 on the clean ingredients list? Yes, it is.

Is 902 a single component or a nonionic blend? It is a blended system, yes. The fact of the matter is that in order to take advantage of all of the different materials that we're trying to...or all the different properties that we're trying to take advantage of, it requires utilizing a blend of different hydrophobes and hydrophilic segments.

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

And what is the CMC of the Tomadol-902? Off the top of my head I cannot answer that. However, I can tell you that it is around 0.05. A lot of times in my brain, I maintain CMC ranges of where things are because that helps me to keep straight what will work where and how much I need to use, and I'm pretty confident in telling you that it's around 0.05. As far as if it's a 0.01 or 0.09, I couldn't tell you, but that's the range. It should be on the technical data sheet for 902 and if you want to shoot us an email or...actually to tell you the truth, you'll probably get one without asking since you've already sent us this question. It'll be on the technical data sheet.

And...Wow, tons of questions, guys. Lots of good ones. Let's see.

Okay. How did these materials perform when compared to hydrocarbon solvents such as mineral spirits? That's... Okay, that is a really difficult one to answer because a hydrocarbon solvent or a mineral spirits is very difficult to emulsify. Generally, really heavy duty hydrocarbon solvents like that, you're going to use them in a, you know, bulk type of system so that they're readily available. And, you know, I'll tell you, I think it would have to be a case-by-case basis. I'm sorry, I can't give a good answer to that. But I think it's going to have to be on a case-by-case basis, taking a look at how well it works.

And here's a question that I really like. It's, where in Memphis did you grow up? And the answer to that is I grew up in Midtown, right across the street from Overton Park. And I know we've got some good customers in Memphis and thank you for that personal question, yeah. I'll see you soon.

So, let's see. How does G-12 and 902 perform against products like NatSurf 265, a Croda product, I believe? Well, it just so happens that we've performed testing against those and, again, it performs very well.

Let's see. When would I use Tomadol-900 or 901 instead of Tomadol-902? Okay, complicated question. You know what I would say? I would say it comes down to how much of an emulsification character do you need? 900 is a very good as a drop-in replacement for the NP-9. It provides good emulsification similar to the NP-9. If you go to 901, which is our first generation of, you know, our high-performance non-ionic surfactant systems, it does not emulsify anywhere near as well as the 900, but it does a very good job of very quickly wetting and penetrating a surface.

The Tomadol-902 is our next step beyond the 901, which again does a very good job of wetting and penetrating a surface. It does emulsify better than the 901, but not as well as the 900. And so going back to that question about utilizing fragrances and making sure that those go in, really, the 900 is going to do a better job probably than the 901 or the 902 would. So thank you for that.

For fabric care, does G-12 always need to be used with 25-7? Not necessarily. 25-7 is a good well [inaudible 00:49:27] surfactant that we always use in our laundry testing because it's very common in the industry, but it can be used with anything. That was just the carrier we used at that particular time. And it's [inaudible 00:49:41] the reason why we used the 25-7, I mentioned the cloud point impact, that was in there basically to raise the cloud point of the G-12 rather than using the G-12 alone which was not, to me, a realistic formula We put in the 25-7 because it's a good surfactant to work with laundry and it will help to solubilize the G-12.

And... Okay. For nonionics, does CMC shift above the cloud point? Yes, that would be a property of the nonionic themselves, yes. Because once we go to a cloud point type situation, then we're actually going to have different aggregation characteristics, and the aggregation characteristics are the things that drive the cloud point. So, yes, you do have a definite CMC shift and, in fact, it becomes much, much lower, and that's one of the reasons why you wanna attain the cloud point. You know, in reality, if you attain the cloud point, you basically turn to surfactants into an oil phase, which is another way of saying solvents, and they can penetrate the soil very well. And then as the temperatures come back down and they become more surfactant-like, then you can have a good, quick oil release. This is something we use in laundry a bit, in industrial laundry a bit. So that's another good question.

But that was our last question, it appears. So if you have another one, you know, slam it out there real fast, but it looks like I successfully managed to get through them all again. Yay! So with that, I wanna thank all you guys for your questions. This has been great. I have to admit, although I like giving the presentations, what I really love is getting questions from everybody that comes in, and I really appreciate it. And I just realized I've got two attendees in the room with me that had...do you guys have any questions? No? Okay. No questions. Oh, wait, one more just came in. Oh, never mind, that was a comment. And I will not repeat

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.

that, but thank you very much. We do our best. And now, I will hand it back to Trey.

Trey: All right, Rick. Thank you so much. And a big thank you to our audience for, yeah, some really great questions and comments. Just a reminder to everybody, we will be sending a copy of the slides to you via email, so do be checking your email for that so you can watch this webinar again and also share it with others at your company. We also encourage you to check out some of the other Evonik webinars that we do have on the Prospector Knowledge Center, some great informative presentations that we've had in the past. So do check those out. Those are on the Prospector Knowledge Center.

But again, everybody, thank you all for attending. Thank you to Evonik and to Rick for a fantastic presentations. We're looking forward to doing more with these guys. A big thank you to everybody for attending and have a great rest of the day.

The views, opinions and technical analyses presented here are those of the author, and are not necessarily those of UL, ULProspector.com or Knowledge.ULProspector.com. While the editors of this site make every effort to verify the accuracy of its content, we assume no responsibility for errors made by the author, editorial staff or any other contributor. All content is subject to copyright and may not be reproduced without prior authorization from Prospector.