C&T

How Do I Thicken My Cosmetic Formula?

Dennis Laba
Elementis Specialties, Hightstown, New Jersey USA

Key words

thickener, rheological additive, viscosity, stability, formulating

Abstract

This article explains how to select a thickener from nine basic thickener groups that enable the chemist to change a product's viscosity and rheological properties such as stability, feel and flow.

Thickening agents are an important part of cosmetic formulating, offering the chemist the opportunity to not only change the viscosity of a product, but to also improve the rheological properties of stability, feel and flow.

This article takes the formulator through the logical sequence of choosing the best thickener for a project, in a simple question and answer format. It further describes the nine basic thickener groups and explains some of the key attributes, both positive and negative, of the most commonly used members of these groups.

The Importance of Questioning

Many aspects of cosmetic science must be questioned every time a formulator takes on a new project. What form should my product take? How stable should it be? Are there legal limits to my active ingredients? Will I need to preserve my formula against microbial attack? How do I prove the effectiveness of my final formula? Does a patent already cover my ideas, or should I file for one? Will I have to worry about irritation effects?

Questioning is a necessary part of any creative endeavor. The more questions we ask ahead of time, the less likely we are to make avoidable mistakes that can turn out to be both costly and time-consuming.

Typically, when we are assigned a project, our supervisor already has a mental image of the finished product. Our job, as the formulator, is to make the product as close to that image as we can. We need to know ahead of time whether we are being asked to come up with a cream, lotion, gel or solid; whether there is a certain physiological effect our formula should have when applied; and if there are any special limitations we need to keep in mind.

We must remember that our product isn't successful unless the consumer buys the product, and likes it enough to go back and buy it again. It may be Marketing's job to convince consumers to purchase the product the first time, but it's our job to ensure that they are not disappointed in what they find, and they will go back for a repeat sale. Therefore, our work is linked with consumer perception. One of the basic questions we must ask ourselves when developing a new formulation is how the consumer will perceive the product.

Consumer perception depends on many aspects (such as odor, color, texture). I want to focus on one aspect that the formulator must be involved with, and that is how "thick" the product is. We all know that one difference between a lotion and a cream is that the cream is thicker than the lotion. But, there is much more to it than just the viscosity difference of the two products.

The cream could also be described as "richer," or more "bodied" than the lotion. It may have completely different rub-in characteristics, and it "stays put" in its jar, whereas the lotion would flow out of that type of container. It would be safe to assume that a "thickener" is a little more complicated than just something that increases the viscosity of a final product. Formulators also call upon thickeners to increase stability, change the flow or rheology of the product, modify the physical appearance of the product and affect the overall consumer perception. All these properties are linked to changes that the formulator might make in the thickening system used. This is why proper selection of a thickener, or thickener system, is a critical decision for the formulator.

Assuming that the decision has been made, and a thicker formula is deemed necessary, there are five questions that need addressing in the preformulation stage:

- How can I thicken my formula?
- What do I expect the thickener to do?
- Does my formula call for any special conditions?

0361-4387/01/0011-0035$05.00/0—

• What kind of thickener do I need?

• Where can I learn how to best use my thickener?

The following discussion of these questions should help new formulators understand what options they have, and how to choose between them during product development.

How Can I Thicken My Formula?

Viscosity is defined as the resistance to flow. Suntan oils offer very little resistance to flow; therefore they have a low viscosity. Antiperspirant sticks offer a lot of resistance to flow, and therefore have a very high viscosity. Suntan oil formulators avoid ingredients like waxes or long-chain alcohols, because they know that these materials will create more viscosity than they want, while antiperspirant stick producers look specifically toward these ingredients. There are even a number of ways formulators can increase the viscosity of their products without adding more ingredients.

Adding solids: Adding solids can raise the viscosity of a formulation by creating additional resistance to an applied force. The additional solids may be active ingredients (as in micronized antiperspirant salts), slip aids (such as boron nitride or talc) added to improve the skin feel of the product, or high concentrations of pigments.

Increasing the internal phase ratio: Increasing the internal phase ratio of an emulsion can also increase the viscosity of a system. As you increase the discontinuous phase concentration, the droplets become more and more crowded. When the material is forced to flow, instead of easily passing by each other, the droplets now bump into each other and offer resistance. As you increase the concentration, you also increase the resistance and the viscosity.

Homogenization: Homogenization of an emulsion can increase the viscosity in a manner similar to increasing the internal phase concentration. When an emulsion is formed, the droplets usually vary widely in size. When the emulsion passes through a homogenizer, the larger particles are broken down into many smaller, more homogeneous ones. This action greatly increases the surface area of the internal phase droplets, which means there is more contact area available for the droplets to hit into each other while flowing. Once again, the viscosity of the product is increased, usually with a concurrent improvement in product stability, as in homogenized milk.

Adding thickeners: Adding thickeners may not be the only way to increase a formula's viscosity, but it is the way that provides the most flexibility. Numerous thickening agents are used in the cosmetics industry with proven safety profiles and effectiveness. The hardest part of using thickeners is narrowing down your choices.

If the system is aqueous, you may need a thickener that thickens water; for a non-aqueous system, you may need an oil thickener. If the product is an emulsion, you will have to decide if you want to thicken the internal phase, the external phase or both phases.

Once you decide exactly what you want to thicken, you then must decide on the type of thickener that you need to use. Again there are choices. Natural or synthetic? Based on clay or a wax? A polymer or a gum? Each has its special properties, and you must be aware of them so you can decide which thickener will best suit your specific needs. However, before you make that decision you need to fully understand your own expectations.

What Do I Expect the Thickener To Do?

Many of the raw materials called "thickeners" really provide a variety of functions, not all of which may be desired in a given formula. It is important to understand exactly what effects you are hoping to achieve by including a thickener, and be aware of any potentially undesirable side effects of its use.

In general, thickeners can be used to increase viscosity, improve stability, change the appearance of products and modify the rheology of the formula. Although some of these will be linked together, we can understand them better by considering them separately.

Increase the viscosity: Increasing viscosity seems to be the most basic of all the effects (Figure 1). If you increase the viscosity of a lotion, you turn it into a cream. If you increase the viscosity of a cream, you can turn it into a paste, and if you increase the viscosity of a paste you can turn it into a solid. Unfortunately, while you are increasing the viscosity, you are probably also adversely affecting other characteristics, like slip, tackiness, rub-in time and the surface texture of the product.

While identifying the ingredients that provide viscosity in your product is important, you must also recognize that increasing or decreasing the concentration of that material may affect the stability, aesthetics and acceptability of the final product. A re-balancing of existing ingredients, or the addition of others, may be called for to offset these changes.

If you are formulating an anionic shampoo, you may be able to take advantage of the thickening effect that typical salts have on your formulation, due to the interaction with your surfactant compounds.

Improve the stability: Improving stability is another effect you may want to achieve by adding a thickener. A more viscous system tends not to change as rapidly as a less viscous one. Instability is typically caused by movement of particles or

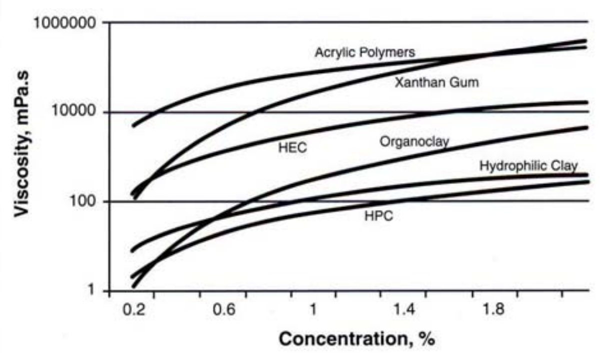

Figure 1. Typical viscosity profiles

phases through a system.

In dispersions or suspensions such as antiperspirants, nail enamels and lipsticks, the solid particles or pigments want to settle to the bottom of the container. By increasing the viscosity of the base fluid, you actually slow down the settling rate, as shown by Stokes' Law (see sidebar).

In the case of emulsions, increasing the viscosity of the external phase also leads to more resistance to the movement of the internal phase, causing the droplets to remain separate and not coalesce. If this coalescence were not controlled it would lead to instability through creaming or phase separation.

If an emulsion's internal phase is the one that is thickened, a different mechanism causes the improvement in stability. In this case, the increase in viscosity makes the internal phase droplet more resistant to changes in shape, and instead of flowing freely through the system in an amoeba-like fashion able to easily slip past other droplets, it is more rigid, and less interactive. Though this procedure may not show a marked increase in the overall viscosity of the formula, its effect on the final product's stability can be significant, and should not be overlooked.

Certain viscosity additives can set up network structures throughout the base fluid, and exhibit a property that is called "yield value." In order for a pigment or particle to settle, it must first overcome the "network strength" or yield value of the system. If the energy needed to break the network is higher than the gravitational energy of the particle, then the network does not break, resulting in suspension of the particle. Clay and polymer additives have high yield values, and are therefore used to help suspension problems.

Stokes' law predicts additional ways of increasing particle suspension. They include minimizing the particle size and decreasing the density difference between the particle and the fluid. A smaller particle will not exert as much gravitational force through the fluid, therefore taking longer to settle, and a particle or droplet of equal or lesser density than the fluid will have less of a tendency to fall to the bottom.

Change the appearance: Changing the appearance of a formula by adding a thickener can help achieve the final consumer acceptance of the product. Thick, rich-looking products tend to be viewed as being more "elegant" or expensive than thin ones. A higher viscosity product sometimes gives the impression of having more of those magic "active ingredients" in it, though it may be functionally the same as a thin one.

Although we know that a product's appearance may have virtually nothing to do with its performance, appearance becomes a formulation issue if the consumer perceives a difference. This is not to say that there are no significant differences brought about by changing the viscosity. As pointed out previously, there are specific reasons that some formulas may be improved by a viscosity increase. Often, that increase will be accompanied by a change in the flow characteristics of the product.

Change the rheology: Changing the rheology, or flow characteristics, exhibited by the product (Figure 2) is something that can be done by adding a "rheological additive." In addition to increasing the viscosity, these additives actually change the way the fluids behave.

All materials flow in a characteristic fashion, and consumers have a preconceived notion of how their cosmetics should behave. Shampoo should flow out of a bottle easily, without shaking. A cold cream should stay in its jar and have an appropriate amount of "pick-up," so that after the formula adheres to your fingers when it is scooped out, it leaves behind the little pointed tips on the surface of the cream. Nail polish should adhere nicely to the brush, yet flow easily onto the nail, and stay there. To help accomplish these different kinds of flow, formulators can choose from a variety of rheological additives with different properties.

Thickening systems for typical shampoos will need to develop Newtonian flow, which is the type of flow you see with water or honey; the fluid retains its original viscosity but is allowed to flow freely. There is no yield value, or minimum force that needs to be exerted before flow will take place.

The cold cream, on the other hand, will need to exhibit pseudoplastic flow, which does have a yield value, but thins down when "sheared" or rubbed, and recovers its viscosity quickly when the shearing stops. Pseudoplastic flow allows for a thick-looking product that can still be rubbed in easily. Under some conditions, the shampoo and the cold cream may have exactly the same viscosity, but the rub-in characteristics would be very different, due to their different rheological systems.

Nail enamels need to thin down when sheared or brushed onto the nail so they can be thin enough to flow properly, yet if they were to recover their viscosity as quickly as a cold cream, the brushmarks would remain visible after the nail polish dries. This is why nail enamels use thixotropic additives that allow a thinning-down period during shear, and a slower, time-dependent recovery of the original viscosity.

The science of rheology can be very complicated, but by this point you can see that on choosing your additive system

Stokes' Law

For a small sphere in a viscous fluid, the rate of fall caused by gravity would be defined as:

$$V = \frac{2ga^2(d_1-d_2)}{9\eta}$$

where V is the velocity of sedimentation
g is the force of gravity
a is the radius of the sphere
d_1 is the density of the sphere
d_2 is the density of the medium
η is the viscosity of the fluid.

According to Stokes' law, the stability of a dispersion or suspension can be improved by increasing the viscosity of the base fluid, which decreases the velocity of sedimentation.

carefully or by using combinations of additives, you can modify the product's recovery time to meet your needs.

Does My Formula Call for Any Special Conditions?

Now that you more fully understand what you expect from your thickener, it's time to review your formulation and ask yourself if there are any special requirements that your target project is going to impose on your thickening system. You may pick the best thickener in the world to work with, but if the additive is green, and your final product profile calls for a white lotion, you may have some problems. Some of the requirements that may be worth thinking about fall into two categories: physical requirements and processing requirements.

Physical requirements: Physical requirements of your formulation include properties like pH, clarity and electrolyte stability. Fortunately, the pH of most cosmetic products falls around neutrality, but there are some formulas on either end of the pH spectrum. For example, antiperspirants are at the acid end of the scale, and depilatories are at the basic end. Since the thickening mechanism of alkali-swellable polymers is incompatible with acidic systems, there is a good reason that you don't find carbomers used with antiperspirant salts.

Clarity in water-based cosmetics is easier to achieve than in oil-based systems, but not all thickeners will be able to give you clear systems. If your target calls for clarity, you should find out how clear it needs to be. Water-white or water-clear would entail both transparency and lack of any color. You should find out if, for example, a slight haze would make the shampoo totally unacceptable, or if an off-white cream is completely out of the question. Often clarity is part of the initial target, but can be compromised if necessary.

Electrolyte stability is a system's resistance to change when in the presence of salts. Many materials will lose viscosity in the presence of electrolytes, and if a salt or a salt-containing compound must be added to your formulation, you may need to be more careful in the selection of functional ingredients such as thickeners. Sometimes, thickeners are less sensitive to electrolytes if you first fully disperse the thickener in the liquid before adding the electrolytes, instead of having the electrolyte present before dispersion.

Processing requirements: Processing requirements of your ingredients, and your total formula, must be taken into consideration during the pre-formulation stage.

If your ingredients need shear to fully activate, the timing of introducing that sheer may need to be carefully planned. Some materials widely used in the cosmetics industry are shear-sensitive, and can be destroyed or harmed by excessive shearing. Fumed silica, as an example, builds its viscosity by creating a chain-like structure that is not shear-stable. Encapsulated materials, like fragrances, can be harmed by shearing, and must be added toward the end of processing so they remain intact. Shear-sensitive materials play a key role in many cosmetic formulations, but extra care must be taken to ensure their integrity.

Temperature requirements should also be taken into account when formulating. Some raw materials, like waxes, need heat during formulation, and some products need a certain kind of mixing during the cool-down to form a particular type of system. Polyethylenes, for example, will cool down into different crystal sizes, depending on the cooling rate and the energy of the mixing, while trihydroxystearin needs to be heated to a certain temperature range and not beyond, or its rheological properties could be lost. If temperature-sensitive materials are used in your formulation, then you must be careful not to underactivate or overheat the materials.

What Kind of Thickener Do I Need?

More than 500 thickeners are listed in the INCI dictionary. How do you know which one to choose? Unfortunately, the "universal thickener" is still only a dream.

One way to narrow the field of choices would be to ask yourself if you are trying to thicken water or oil. Thickeners can then be divided into at least these two general categories: those that work best in water, and those that work best in oils. However, the base chemistries of cosmetic ingredients have undergone so many chemical modifications that you can't always tell easily if an ingredient is for water-based or oil-based products.

Another question to ask yourself is whether you are trying to thicken an emulsion. If you are, then you may need to modify both the oil and water phases in the product, for different reasons. In that case, you may find yourself looking for two thickeners from different groups.

To describe all the different groups and types of thickeners is well beyond the scope the basic technologies discussed in this article. However, certain ingredients are often used, and every formulator should be somewhat familiar with them. We will focus on nine ingredient groups listed in the sidebar, and categorize them as either aqueous thickeners or non-aqueous thickeners. Table 1 compares the properties of the ingredients in these groups.

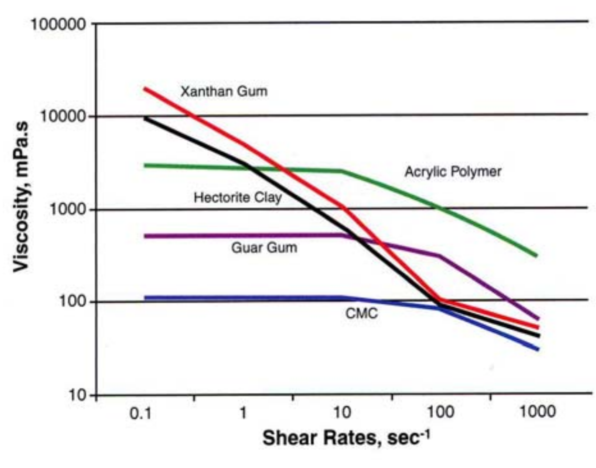

Figure 2. Comparative rheological profiles

Aqueous Thickeners

Cellulose and derivatives: Cellulose and its derivatives make up a group of ingredients that vary in their degree of electrolyte stability, rheology and pH compatibilities. Cellulose is derived from wood or cotton pulp, so it can be regarded as coming from a natural, renewable resource. There are several reactions that cellulose can undergo to provide various thickeners important to the cosmetics and toiletries markets. All the ingredients in this group thicken by a hydrogen-bonding mechanism of their solublized chains.

Cellulose reaction with acid provides what is known as cellulose gum. This material is used as a thickener in food applications as well as in personal care. It is offered in various degrees of substitution, which will affect the degree of salt tolerance as well as the rheology achieved.

Hydroxyethylcellulose is prepared by reacting the cellulose with ethylene oxide. It comes in various molar substitution ranges, which affect the resulting viscosities.

Cetyl hydroxyethylcellulose combines the hydrophilic hydroxyethylcellulose with hydrophobic cetyl chains. This results in a compound that exhibits a yield value and also allows it to thicken by an additional "associative" mechanism (see sidebar).

Reacting cellulose with methyl chloride and/or propylene oxide gives two more cellulose derivatives: methylcellulose and hydroxypropyl methylcellulose. Methylcellulose finds use in lotions, while hydroxypropyl methylcellulose is used primarily in lathering products due to its foam stabilization. Hydroxypropylcellulose is prepared by reacting cellulose with propylene oxide. It is used to prepare clear gels in alcohols, glycols and PEGs, with main uses in hair-care products.

All the cellulose derivatives tend to give pseudoplastic, electrolyte-tolerant thickening.

Hydrophilic clays: Hydrophilic clays that are important to the cosmetics industry fall into three categories: hectorites,

Families of Thickeners Commonly Used in Cosmetics

Aqueous Thickeners
- Cellulose and its derivatives
- Clays
- Gums
- PEGs and their modifications
- Synthetic polymers

Non-Aqueous Thickeners
- Organics
- Organoclays
- Polyethylenes
- Silicas

Associative Thickeners

The attraction of the hydrophobic part of a thickener such as cetyl hydroxyethylcellulose to non-aqueous compounds like surfactants allows this ingredient to be soluble, and active as a thickener, in different kinds of systems. This type of hydrophobic modification has opened up a new classification of products called "associative thickeners," which are just beginning to be understood and accepted into the cosmetics industry.

Associative thickeners are not restricted to the cellulosics alone; they are also being created with synthetic polymers. Some of these compounds can associate with oils, surfactants, and even particles, depending on the hydrophobe chemistries used.

Typically, associative thickeners are very efficient and are used at low concentrations.

Table 1. Comparison of thickener properties

Thickener	Compatability	Rheology	Yield value	Electrolyte stability
Aqueous thickeners				
Cellulose gum	water	thixotropic	yes	yes
Guar gum	water	pseudoplastic	no	yes
Xanthan gum	water	pseudoplastic	yes	yes
Hydroxyethylcellulose	water	pseudoplastic	no	yes
Methylcellulose	water	pseudoplastic	yes	yes
Hydroxypropyl methylcellulose	water	pseudoplastic	no	yes
Carbomers	water	pseudoplastic	yes	no
Acrylates / VA crosspolymers	water	pseudoplastic	yes	no
Polyethylene glycols	water	Newtonian	no	yes
Clays	water	thixotropic	yes	yes
Non-Aqueous thickeners				
Polyethylenes	oil	pseudoplastic	yes	
Trihydroxystearin (organic)	oil	thixotropic	yes	
Organoclays	oil	thixotropic	yes	
Fumed silica	oil	thixotropic	yes	

bentonites and magnesium aluminum silicates. There are differences in color and gel strength between the groups, with hectorite having the lightest color and highest viscosities. A synthetic form of hectorite has been marketed for some time; unlike the natural clays, it can form clear gels.

Gums: Gums, as a category, are not as widely used in today's cosmetics as they were some years ago, principally because new technologies have provided competing thickeners that have more reliable availability than the natural gums.

The main types of gums used today include guar gum, carrageenan and xanthan gum, coming from seeds, seaweed and microbial fermentation, respectively. Guar and xanthan are both branched-chain polysaccharides, while carrageenan is a straight chain. All three will give pseudoplastic rheology, but carrageenan can also be supplied with a different chemistry and structure, giving thixotropic rheology.

If gellation at an acidic extreme is needed, guar gum is suitable down to a pH of about 1, while the others are not as effective below a pH of 3. On the other extreme, xanthan gum can be used up to a pH of approximately 12, while the others drop off in efficiency above pH 10.

Polyethylene glycols: Polyethylene glycols and their modifications are usually characterized by their average molecular weight distribution, giving PEG 200 through PEG 6000. All are water-soluble thickeners that also have solubility in alcohols and glycols. Other important functions would include their lubricity properties and their humectancy. Because of their water solubility, higher-molecular-weight PEGs may be used instead of waxes as co-thickening agents with stearyl alcohol in antiperspirant sticks.

Modifications include PEG mono- and distearates and PEG 150 pentaerythrityl tetrastearate used for their viscosity-building properties in surfactant systems such as shampoos.

Synthetic polymers: Synthetic polymers make up a group of products that are widely used as thickeners in many areas of cosmetics. These long chains of monomers need to be neutralized by bases before they fully uncoil from their acid state.

Synthetic polymers show exceptional thickening efficiencies, being used typically between 0.2% and 0.5%. They can be used to form clear, aqueous gels. Their viscosity-building powers work best in the pH 5-10 range, dropping off sharply outside of this range. Fortunately, cosmetic creams and lotions are mostly in this range, since the pH of the skin is approximately 5.5.

When using "alkali-swellable polymers," the formulator should keep in mind that different neutralizing agents can give different efficiencies in viscosity build, and may affect the final product's clarity. Due to the length and nature of the polymer chains, high shear conditions can cause permanent viscosity loss, and salts can dramatically affect viscosity. Care should be taken during formulation and processing to avoid these conditions whenever possible.

Homopolymers of acrylic acid are defined as "carbomers" in the INCI Dictionary, while products that use two or more monomers usually have the individual polymers listed and are called copolymers, such as acrylates/steareth-20 methacrylate copolymer. When a crosslinking agent is used in the polymer make-up, the term "crosspolymer" is in the INCI name, as in acrylates/VA crosspolymer.

Non-Aqueous Thickeners

Organic thickeners: Organic thickeners offer several different choices for modifying the viscosity or rheology of oils or solvents.

One group that has been around for years is the traditional waxes. These products typically are supplied in solid form, and need to be heated before they are effective. They do not show electrolyte sensitivity, since they are typically dispersed into an oil phase, and are not used for clear systems. Waxes are often used as the bodying agent in solid products, such as lipsticks and eyeliners, but they are not used in antiperspirant sticks, where they would cause encapsulation of the water-soluble active ingredient, rendering it ineffective.

The more common waxes used in cosmetic systems are beeswax, candellilia, carnauba and ozokerite. Each offers different levels of film forming, hardness and gloss. To benefit from the different properties of these waxes, blends of several waxes are often used.

Long-chain alcohols – typically cetyl alcohol and stearyl alcohols or blends of the two – are also used to provide body to sticks, as well as creams and lotions. Antiperspirant sticks are based on the smooth-feeling compatibility between stearyl alcohol and cyclomethicone.

Adding a long-chain alcohol to an internal phase of an oil-in-water emulsion will help stabilize the emulsion. It will also increase the viscosity, without imparting the stickiness that might result from adding a waxy ingredient. The long-chain moiety provides excellent compatibility in non-polar oils, which is why it is often used to chemically modify other compounds.

Trihydroxystearin takes advantage of this effect. It has three long-chain stearyl groups attached to a glycerine backbone. This compatibility allows it to be an excellent thickening agent for lipsticks and antiperspirant 'soft-sticks,' providing a creamy consistency and thixotropic rheology. It is also used to contribute a stabilizing effect for creams and lotions.

Organoclays: Organoclays are hydrophilic clays modified with quaternary ammonium compounds to make them compatible in cosmetic oils. These materials are found throughout the cosmetics industry, being the primary rheological additives and suspending agents in antiperspirant roll-ons and aerosols, nail polish and mascaras. They are finding an increased usage in creams and lotions to modify the feel of the oil phase on the skin once the aqueous phase has evaporated or been absorbed. Hectorite-based organoclays are more often used in cosmetics than bentonite organoclays because they are more effective, their color is lighter and they show less stain-producing power.

By changing the quaternary compound that is reacted with the base clay, one can get compatibility with oils of different polarity. The original organoclays were prepared with tallow-based quaternaries, but recent advancements in this area have made available organoclays prepared with vegetable-based quaternary compounds.

One drawback to the use of powdered organoclays is the high shear equipment needed for full activation, but the offering of pre-gelled versions in a variety of cosmetic oils has made this technology available to even the smallest cosmetic house.

Polyethylenes: Polyethylenes have found some use in the cosmetics industry as efficient gellation agents for low polarity oils, such as mineral oil. They provide thixotropic rheology and offer the potential of clear anhydrous gels.

Formulators should be aware that higher than normal heat is required (i.e., 80-130°C) to solubilize the polyethylenes, and the viscosity and clarity achieved can be greatly affected by the cooling rate used. If a quick-cooling rate is used, the resulting product will be made up of very small crystals, leading to higher viscosities and better clarity.

Silica: The silica most commonly used in cosmetics is also known as "fumed silica" to differentiate it from "hydrated silicas" more commonly used in dentrifices. The two types use different manufacturing procedures. Fumed silica comes from a vapor-phase technology, which provides a larger surface area.

The viscosity mechanism used by silica is interparticle hydrogen bonding, forming aggregates throughout the liquid. Because of its low isoelectric point, silica quickly loses its viscosity properties as the pH rises above neutrality, so formulators of higher-pH products should avoid depending on it.

Another property the formulator must keep in mind is that high shear can cause the aggregate viscosity-building structure to break down.

Where Can I Learn How to Best Use My Thickener?

As you've seen above, each thickening agent has certain properties as well as certain requirements for efficient use. Learning all the different nuances of each ingredient in this rapidly expanding field is becoming impossible. Of course, the formulator should know the basic groups, and at least a little about each one, but for fine tuning product development, it is necessary to go to outside sources for the full story behind the ingredients. Fortunately, there are several places from which to choose.

Suppliers: Supplier literature and technical service departments are great places to start understanding the products you are thinking about using. Who knows the products better than the company and the people who have been working with them for years?

The literature put out by good suppliers goes far beyond just talking about specifications. It also discusses product mechanisms, compatibilities and incompatibilities, typical commercial uses and levels of use, as well as the all-important incorporation procedures. Often there are even excellent formulation examples available for distribution to prospective customers.

If you have questions about the product, or if you would like to discuss a thickener you need for a new project you are working on, ask for the supplier's technical service department. Chances are that an expert there can help you better understand how to use the supplier's product, and you may even get some new perspectives on your project.

If the technical service department can't answer your question, the supplier can turn to other employees with experience and knowledge in research and development, manufacturing, quality assurance, or process engineering. Their job is to help you use the products most efficiently, but they can't help unless you let them know you need help.

Experienced friends: Experienced friends can also make formulating much more pleasant. You may find that some of your coworkers have already worked with that type of product on a previous project, and discovered a few good tips along the way.

Occasional attendance at the society meetings allows you to meet a good number of people that may be working with the same types of ingredients that you are working with. You don't have to spill company secrets to everyone you meet, but after talking to them a few times, you may start to get more comfortable with them, and find that you can both be important resources to one another.

Internet: The Internet is a great source of product information. Most companies now have Web sites that include product data sheets, material safety data sheets, formulation information, usage level information, literature and links back to the sample, marketing or technical service departments. If articles have been written about the materials, very often a search engine can find references to those articles.

Print publications: Other references formulators may find helpful include industry-oriented books and magazines. Almost every new raw material has been written about in a publication somewhere; all you have to do is find it.

There are a handful of excellent compilations about cosmetic technology, and several multi-volume series that go into detail concerning many aspects of cosmetic science. Patent files are searchable, and patents themselves often offer very detailed descriptions of how the raw material is used, as well as its advantages over competitive products.

The amount of information published today is certainly overwhelming. The good news is that if the current communications trend continues, almost all of this will someday be searchable by computer. When that happens, I'm sure we will better understand a large part of cosmetic science, but I think there will always be a certain aspect of "black magic" involved in the art of formulating. C&T

References

Address correspondence to Dennis Laba, c/o Editor, *Cosmetics & Toiletries* magazine, 362 South Schmale Road, Carol Stream, IL 60188-2787 USA.

Reprint from November 2001 ***Cosmetics & Toiletries*** magazine, Vol. 116, No. 11, p. 35-44.


Our Products in Cosmetics
BENTONE®
Flow Control Agents
MA/EW/LT: Clays for aqueous phase thickening
27 V and 38 V: Vegetable route organoclays for organic phase
V Gels: Easy to use organoclay dispersions (based on non-animal origin ingredients)
THIXCIN® R
Trihydroxystearin as stiffening agent in lipsticks and ointments
NANOX®
Zinc Oxide Range
200 series: Nano-sized ZnO powder and gel for sun care applications
500 series: High Surface Area ZnO with improved absorption characteristics
Elementis Specialties
Cosmetics
Europe Zwijnaardsesteenweg 316A, Blok E - B-9000 Gent - Belgium
tel. + 32 9 242 96 42 - fax + 32 9 242 96 58 - e-mail: consumer@elementis-eu.com
U.S. P.O. Box 700 - Hightstown - NJ 08520 - USA
tel. + 1 609 443 2500 - fax + 1 609 443 2446 - e-mail: consumer@elementis-eu.com
ELEMENTIS
SPECIALTIES
pure in cosmetics