

# Shelf Preservation

An In-Depth Look at Product Shelf Life  
in Skincare



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## Shelf Preservation

When shopping for skin care products, whether backbar or retail, most aestheticians and consumers make their choices based on performance ingredients. They look at the front of the bottle or the packaging to see what miracle or star ingredients the product boasts. Then, they read the product description in the brochure or on the website to see what else is inside and what its purported benefits are. If at a tradeshow or store, they might talk with a brand representative to learn more about the product. Maybe they will ask to see full ingredient decks to get a better idea of the formulation as a whole, to get an idea of whether or not the star ingredients actually have a chance of performing their promised benefit.

While many educated skin care professionals and consumers now look towards the bottom of the ingredient decks to see what kind of preservatives and fragrances are inside, other than that, not much attention is paid to the functional ingredients within the product. Not as much attention is paid to the product's packaging, other than its overall aesthetic and maybe how much space it takes up on a shelf. While many educated skin care professionals and consumers now look towards the bottom of the ingredient decks to see what kind of preservatives and fragrances are inside, other than that, not much attention is paid to the functional ingredients within the product. Not as much attention is paid to the product's packaging, other than its overall aesthetic and maybe how much space it takes up on a shelf.

What any spa manager, aesthetician, purchaser, or even consumer needs to understand is that the most important factors to consider when deciding which line to carry, or which product to purchase, have more to do with the less popular functional ingredients. These are ingredients such as emulsifiers, stabilizers, preservatives, solubilizers, gelling agents, antioxidants, pH adjusters, and other ingredients that most people tend to skim over when reading the ingredient decks.

Functional ingredients are the unsung heroes of skin care formulation because, without them, the performance ingredients cannot perform. Just like actors need set designers, background extras, musicians, and stage, sound, and lighting crews in order to deliver memorable performances, botanical extracts, vitamins, peptides, stem cells, and other star skin care ingredients need their functional “crew” to keep them fresh and together so they can benefit the skin. Even more important, functional ingredients keep the product as a whole intact and are a key part of what gives the product its shelf life.

### Understanding Shelf Life

Shelf life goes beyond how long a product lasts on the shelf. What does that mean? How long before it grows bacteria, mold, and yeast without needing refrigeration? How long before an emulsion (cream or lotion made with both hydrous and anhydrous ingredients held together in a uniform consistency by an emulsifier) separates? How long before the lipids oxidize and go rancid? How long before the actives and extracts degrade? The answer is all of the above. A product's shelf life means the time period in which the product can be used safely without pathogens taking up residence inside the bottle, lipid oxidation or rancidity, nutrient or active compound degradation, a change in pH, and separation or other signs of instability occurring – all without the need for refrigeration.



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Some products naturally have a longer shelf life. For example, anhydrous products made with a high concentration of waxes, esters, and saturated lipids (such as shea butter, meadowfoam seed oil, and jojoba oil) could have a shelf life of several years without the need for preservation or the addition of an antioxidant. Dry products, such as powdered clays or dehydrated, loose herbs, could stay fresh for up to two years if stored properly.

Shelf life naturally becomes shorter with the introduction of two key factors: oxygen and microbial growth.

While anhydrous products do come with less concern about microbial growth (though end-user contamination is always possible), one cannot automatically assume that they have a longer shelf life. If they are made with polyunsaturated, unsaturated, or supersaturated lipids (common ones are rosehip seed oil and hemp seed oil) they are much more susceptible to oxidation and degradation when exposed to heat, light, and air.

The products that need the most assistance from functional ingredients to have any sort of shelf life, however, are products that contain water. All products that contain water are automatically at risk of microbial growth and require proper application of a broad-spectrum preservative in order to have any sort of shelf life outside of short-term refrigeration. Without a proper preservation system in place, microbial growth can begin in as little as one day.



# Facts About Preservatives

Preservatives are possibly the most controversial ingredients in all of the skin care and personal care product industries. For every study conducted that “proves” that a preservative is toxic, there will be another study from just as reputable a scientific journal that proves its safety. The growing trend of using herbs, clays, botanical extracts, and other natural and naturally derived ingredients in products also presents a formulation challenge.

While water-containing products are already more susceptible to microbial growth, once plant matter, absorbing ingredients, and other water activity-increasing ingredients are introduced into a formulation, its potential to grow gram positive and gram negative bacteria, mold, and yeast magnifies. These types of products are even more difficult to adequately preserve, even with standard preservatives.

Paraben-free, synthetic, chemical-free, natural, and organic trends took off faster than less controversial, but still effective, preservation systems were available. This resulted in products that went bad before they could even be sold, product recalls, and a return to using paragon and other standard preservatives. This also resulted in an onslaught of DIYers educating people that certain natural ingredients – such as vitamin E oil, apple cider vinegar, kombucha, grapefruit seed extract, and essential oils – could be used effectively as preservatives, which simply is not true.



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This chain of events resulted in increased incidences of skin irritant and allergic reactions and even reports of eye and sinus infections related to contaminated product use. It also led to a rather divided industry, rife with fear mongering and misinformation on both sides – conventional and natural.

Since then, there has been great advancement in green chemistry and there are more broad- spectrum preservatives available to formulators and manufacturers today that are approved for use in organic and certified non-toxic products by organizations such as ECOCERT, NaTrue, MadeSafe, COSMOS, and the Environmental Working Group.



Five years ago, a formulator would be lucky to get a six to 12 month shelf life using the available natural preservation systems. However, today's natural and synthetic, but approved for use in natural and organic formulations, preservatives – paired with innovations in formulation like hurdle technology and advancements in packaging (airless pumps, Miron glass bottles, aseptic bottles and pouches, and so forth) – are seeing an increase in shelf life that is upwards of two years. Whether preservatives are the tried and true standard options or the promising newer, natural options, the fact is that they are absolutely necessary to ensure safe shelf life on any product that contains water or any water-containing ingredients.

### Product Stability

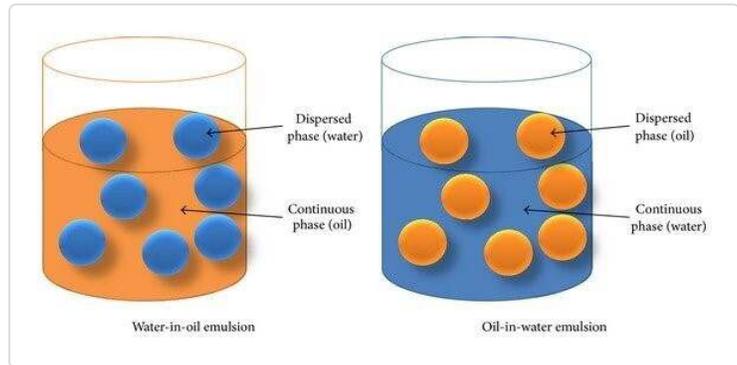
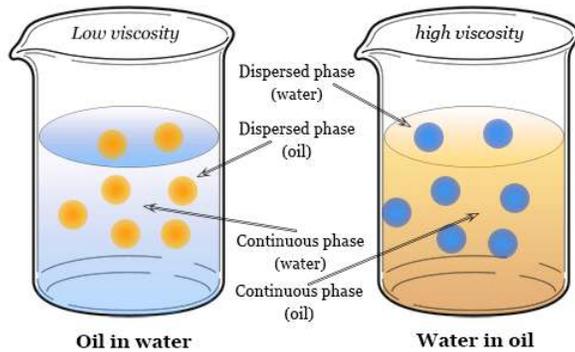
In addition to a proper, broad-spectrum preservation system, a cream or lotion must be emulsified properly with a proper emulsification system to stay together (meaning not separate back into layers of aqueous and lipid ingredients) and be considered shelf stable. As demand for more natural products has increased, so has a misunderstanding of what a natural emulsifier actually is. While certain natural ingredients, like beeswax and lecithin, do naturally possess emulsifying and binding properties and may keep an emulsion together for a short period of time, these are not sufficient for long-term shelf stability.

While many naturally- derived emulsifiers are available, which are typically fatty acids and waxes synthesized from plants such as soybeans, coconuts and other palms, and olives, these would not be considered 100 percent natural. Also, using a single fatty acid or ester, such as stearic acid, is not enough to hold an emulsion together long-term.



Most emulsions, whether natural or synthetic, require a proper emulsification system consisting of an emulsifier – which is usually a blend of more than one type of fatty acid and wax and, sometimes, even a surfactant – plus other binders, stabilizers, and gelling agents (some natural ones include acacia gum or guar gum) in order to remain stable. When an emulsification system is inadequate and the cream or lotion separates, this can negatively affect the product's pH and the efficacy of the performance ingredients in either the water or oil phase of the emulsion and can deactivate the preservation system, which can lead to microbial growth in the water phase.

## Types of Emulsions



## Packaging

Another key factor that both determines and affects a product's shelf life is its packaging. While certain products do fine in wide-rim jars, other products should not be exposed to that much heat, light, and potential moisture and should be packaged in bottles, tubes, or pumps. Even products that have been properly preserved and have tested stable can be contaminated or experience nutrient degradation from repeated exposure to heat, light, moisture, and oxygen.

Bottles with pumps or spray tops that do not require constant opening and closing, and bottles that are dark or opaque instead of clear, will extend a product's shelf life. Besides the type and shape of the bottles and jars, the composition of the bottles and jars themselves is an important part of the discussion. Glass bottles – dark colored and opaque glass bottles, in particular – are preferred because glass can be sterilized and it also does not break down and leach toxic chemicals into the product.



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While plastic bottles are less expensive and less likely to break, many plastics still used to package skin care do leach endocrine-disrupting and otherwise toxic chemicals into the products. This happens either over time or due to a chemical reaction between the plastic and certain ingredients in the product, such as acids, polymers, and essential oils. This not only becomes a health concern but can also speed up the degradation of the active and performance ingredients in the product, especially if the plastic is exposed to heat or certain types of light. While many plastics now used in cosmetics are free of bisphenol A (BPA), they still contain other bisphenols such as BPS, which is similar in chemical constitution to BPA, and is just as toxic; and they still contain endocrine-disrupting phthalates.

Phthalates are not only controversial health wise, but their degradation may also interfere with the efficacy of the ingredients inside the bottle, as well as the product's stability. Certain types of plastic, such as high-density polyethylene (HDPE), low-density polyethylene (LDPE), and polypropylene (PP), have a lower risk of toxicity than other types, such as polystyrene, PVC, and PET.



# Expiration Dates & Safety Testing

While the FDA does have some guidelines for cosmetic manufacturers, they do not regulate cosmetics in the same way they do food and drugs. The FDA does state that the manufacturer is responsible for the safety of the product, but they do not state specific guidelines for what safety testing consists of. In other countries, cosmetics are required to undergo microbial challenge and stability testing to ensure product safety and predict Period After Opening (PAO) shelf life, but in the United States, that is not required.

Expiration dates are also something that is encouraged but not required by the FDA for cosmetics. Since challenge and safety testing are not required and, therefore, are not always conducted by cosmetic manufacturers in the United States due to the high cost, most expiration dates are estimations. It is important to note that the expiration date is timed from the date of manufacture, not the date the product is opened. The expiration date itself is not only reliant on proper preservation and emulsification, but also on the state of the raw ingredients before they go into the end products and how the products are stored before they get to the end user.

So, if a product has spent a large amount of time and has undergone temperature changes and different environments due to transit, warehousing, and retail shelf time, its shelf life could almost be up by the time the end user even opens it. It is a good idea to check that skin care and personal care products are manufactured and stored in third party, GMP-certified facilities.



### Improving Shelf Life

Despite factors that affect a product's shelf life before it gets to the client, most things that cause a product to degrade or spoil quickly do happen due to the client's actions. That being said, the client is always right, so even if a product goes bad because of something the client has done wrong, the liability goes back to where the product came from – *the person who sold and manufactured it.*



It is very important that aestheticians and spa retail staff educate clients on how to properly use and store their products.

It is also crucial that spa staff stores both backbar and retail inventory properly. The FDA's website has great recommendations for good manufacturing practices, which also translate to proper storage in a stock room or retail setting. As professionals consider all the factors that contribute to a product's shelf life and teach clients best practices for home use, they will ensure the highest standard of safety when it comes to products used and sold in the spa.

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